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VIEWS, NEWS AND INTERVIEWS.

It is reported that on very windy days Philadelphia motormen wear veils to protect their complexions.

A New York newspaper man reports that he has discovered a wonderful inventor in Canal street. His latest inventions are calorified and vibrant artificial hands and feet. His brother had an artificial hand which on cold days sent shivers through the inventor when he shook it. This gave him his idea. He went to work and produced his invention in the practical form of an artificial hand with improvements. He asked the reporter to shake the hand.

"Grab it as you would a natural hand," said the inventor, "press it gently, and let your hand rest for a moment. You'll find it a tingler."

That was just what the hand seemed to be—a tingler. The hand was covered with a kid glove, and underneath the glove there was felt a gentle throbbing motion which seemed to be communicated to the living hand, while an equally gentle and pleasant warmth was plainly perceptible. It seemed hard indeed to realize that the hand was not one of living flesh and blood, instead of a piece of mechanism.

"How is it done?" said the inventor. "Oh, easy enough. It's just electricity. Right here, where the stump fits in, you'll observe is a small dry battery. From it a current is sent down to the fingers where it passes through minute tubes, or veins if you will, of asbestos; that is the heating system. A second current sets in motion a number of small diaphragms which lie along the palm, and it is that part of the arrangement which gives the throbbing motion to the hand."

Vancouver, British Columbia, is going to Lexow its police force. Recent disclosures are said to have furnished the Police Committee with proof that Sergeant Haywood had his house connected with the electric light system at the police station and has never paid a cent for light. The sergeant hopes to make light of the charges pending against him.

An old Frenchman who owns a farm on the Gratiot road near Mt. Clements, Mich., on being asked to subscribe toward the bonus for the electric road said: "You say hit will make de land go way hup, hey? Hi suppose hit will rise so fast dat in tree week hafter she get runnin' der will be nothing but mountain between Detroit and Mt. Clemon."

Overland telegraphic communication between India and China has at last been established by the junction of the Burmese and Chinese lines on March 16.

Six hundred creosoted telegraph poles to hold wires which pass over the high mountains of Mexico were sent out to Tampico on the British steamship "Benwick," from Philadelphia. The poles were so black with the oil which had been forced through them that they resembled iron in both weight and color. It has been found in Mexico that wood is so rapidly destroyed by tropical birds and insects that it was necessary to inject some poison that would have the double purpose of preserving the wood and preventing the poles from being used for roosting purposes. Copper wires are almost exclusively used, as they have been found to last longer and hold the weight of birds and monkeys, which crowd them at night.

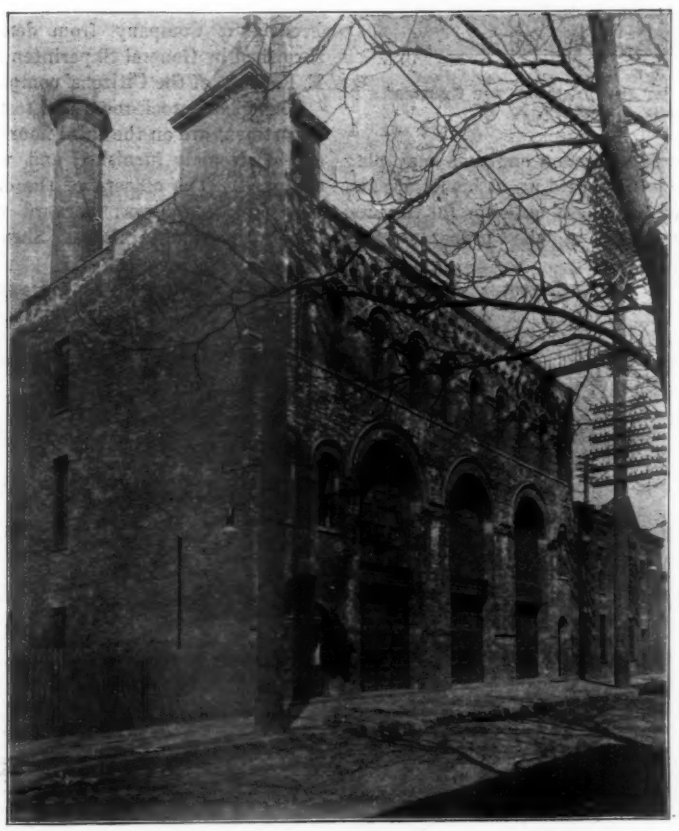

FIG. 1.—PLANT OF THE CITIZENS' ELECTRIC ILLUMINATING COMPANY, OF BROOKLYN, N. Y.

THE NEW STATION OF THE CITIZENS' ELECTRIC ILLUMINATING COMPANY, BROOKLYN, N. Y.

AN INTERESTING MODERN INSTALLATION.

The Citizens' Electric Illuminating Company, of Brooklyn, N. Y., have recently erected an extensive addition to their plant located at Rockwell place and DeKalb avenue. Some of the features are illustrated herewith.

The addition is a handsome three-story fireproof building, 75x100 feet, thoroughly equipped in accordance with modern engineering practice. The first floor is divided into two rooms, devoted, respectively, to boilers and engines. Two vertical condensing engines have been erected in the engine room, leaving ample room for four more of the same type. The dimensions of the engines are as follows: Diameter of high-pressure cylinder, 13 inches; of the intermediate cylinder, 21 inches; and each low-pressure cylinder, 23 inches; stroke, 24 inches. The engine will develop, with 155 revolutions per minute and 150 pounds initial pressure condensing, 400 horse-power economically; that is, with the cut-off in the high-pressure cylinder of about four-tenths. The maximum cut-off allowed by the governor gives a large reserve over this.

Connected with these engines are two vertical condensers, each having a capacity to condense 25,000 pounds of exhaust steam per hour, when supplied with injection water at a temperature not exceeding 52 degrees Fahrenheit. Water for the condensers is supplied from a system of driven wells having a capacity of 2,000 gallons per minute.

Feed water for the boilers of both the old and new plant is heated by two 2,000 horse-power Goubert heaters. A well-lighted and ventilated dynamo room occupies the second floor. Two lines of shafting, furnished by the Falls Rivet and Machine Company, run nearly the entire length of this room, to which are belted at present 28 Thomson-Houston arc dynamos with a capacity

of 45 lights each. The leather belting for the main driving belts, viz.: two 48-inch three-ply belts and all of the dynamo belts were manufactured by Chas. A. Schieren & Company and are of their celebrated electric grade. At one end of this room is a large arc switchboard extending nearly the whole width of the building. This board handles 96 circuits and 72 dynamos, and is divided into three sections, the dynamos and circuits on each section being interchangeable, and by means of brass "bus" bars extending the entire length of the board any circuit may be transferred to either of the other sections. The board is made up of a series of slate panels seven feet long, six inches wide and one and one-quarter inches thick, supported by an iron frame at top and bottom. The circuit terminals are vertical strips of brass three-quarter inch by one-quarter inch, to which are fastened removable brass sockets. These sockets extend partly through the slate, but do not touch it, the holes in the slate being bored large enough to prevent this. Horizontal strips of brass, supported eight inches in the rear of the board by means of iron bolts fastened to the slate, represent the dynamo terminals. Brass sockets are attached to these strips in the same manner as those to the circuit terminals. A brass plug is used as a connecting link. Precaution has been taken to insulate every piece of live metal from the slate by means of hard rubber. It is impossible by any means to get into contact with a piece of live metal from the front of the board. At the top of each panel is an absolute cut-out, by means of which a circuit may be connected or disconnected without the use of the brass plugs. In other words, a dynamo engineer may plug the entire board up at his leisure and then use these cut-outs for the final connection at the proper starting time. They also serve as a quick means of disconnecting circuits in case of accident. The balance of the board is made up of a series of slate slabs, to which are fastened 192 Thomson-Houston lightning arresters, 96 Weston ammeters, especially designed for the work, and three Weston voltmeters connected with multipliers and ground-detecting switches. The whole board is 54 feet long and 13 feet high and is one of the largest in the country. The board was manufactured by V. Prentiss & Company from designs furnished by General Superintendent E. F. Peck, of the Citizens' company.

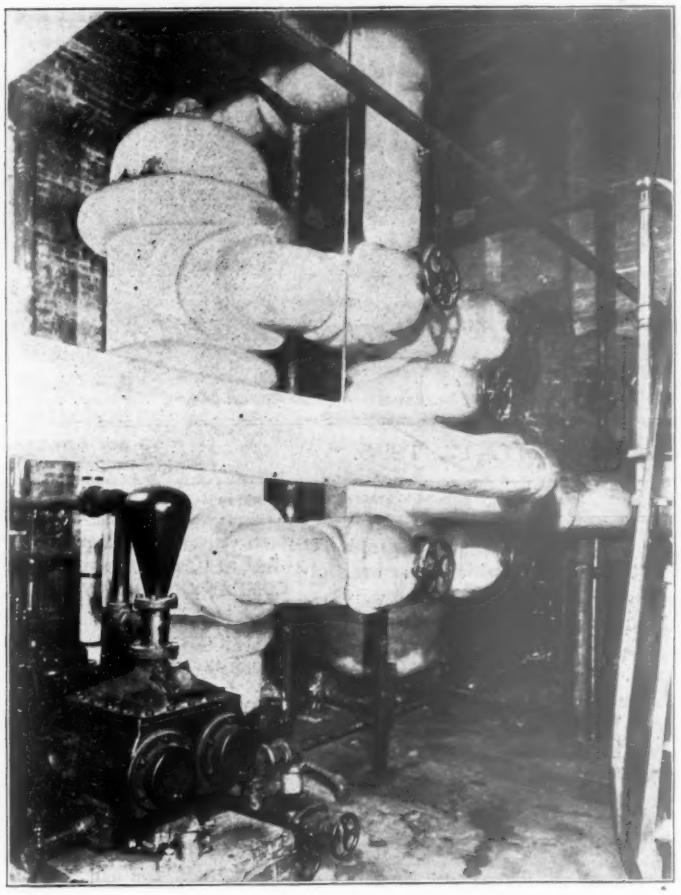

FIG. 2.—GOUBERT FEED-WATER HEATERS AT THE PLANT OF THE CITIZENS' ELECTRIC ILLUMINATING COMPANY, BROOKLYN, N. Y.

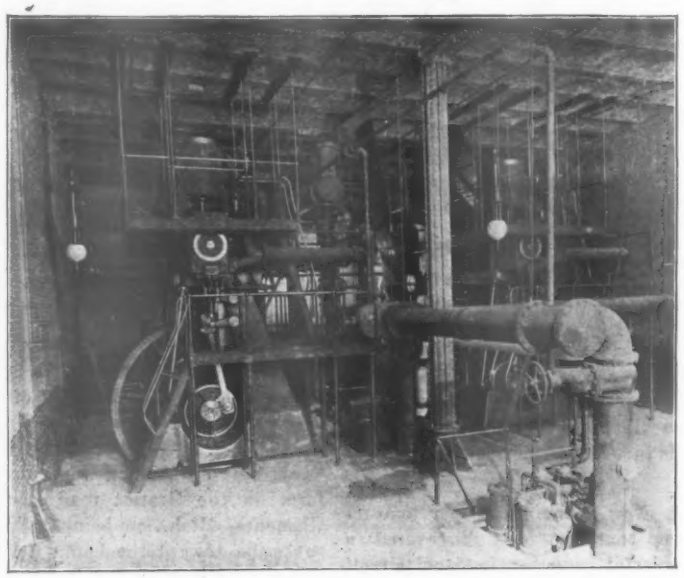

FIG. 3.—VERTICAL ENGINES AT THE PLANT OF THE CITIZENS' ELECTRIC ILLUMINATING COMPANY, BROOKLYN, N. Y.

The offices, stock-room and testing department are on the third floor and are handsomely furnished and well-equipped. The officers of the company are as follows: Bernard Gallagher, president; James Shevlin, vice-president; John Delmar, secretary; Thos. F. Nevins, treasurer; and Edward F. Peck, general superintendent.

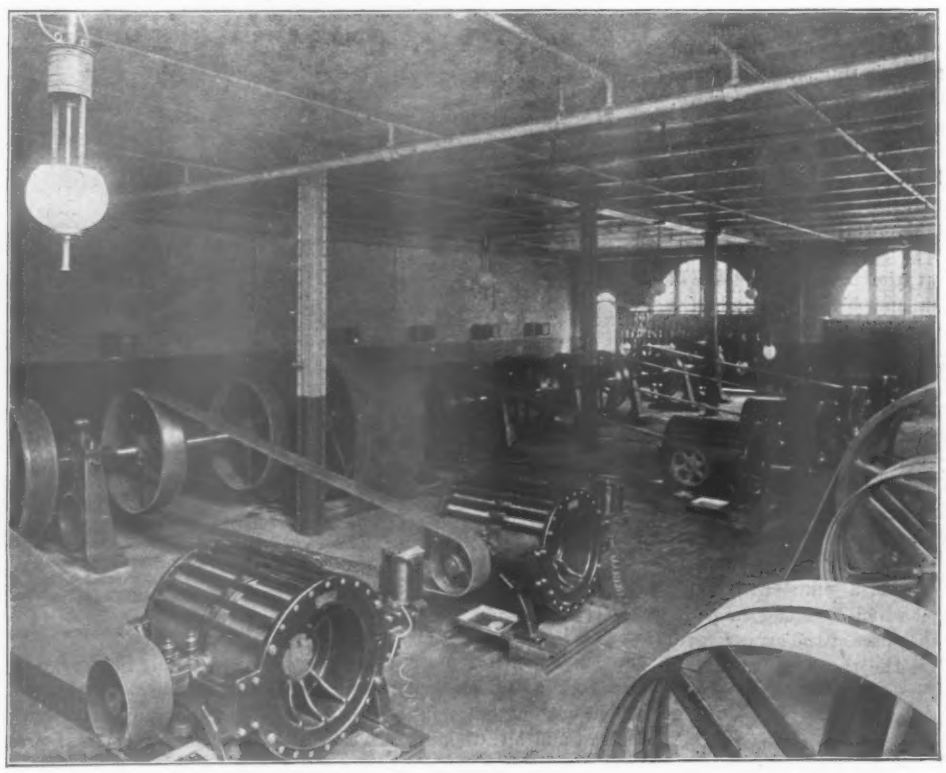

FIG. 4.—DYNAMO ROOM, CITIZENS' ELECTRIC ILLUMINATING COMPANY, BROOKLYN, N. Y.

The Mountains of Australia.

TO THE EDITOR OF ELECTRICAL REVIEW:

In reading No. 13 of your esteemed paper the enclosed article about an electric light plant in Australia at the enormous elevation of 12,500 feet has commanded my attention.

The mainland of Australia is known for having few and not very high mountains, and in referring to an excellent map work I find the following figures for the Australian Alps, in which the plant referred to is located: Mount Kosciusko, 7,176 feet (highest elevation); Mount Bogong, 6,508 feet; Mount Hotham, 6,414 feet.

Your correspondent evidently must have made a mistake, and if you will deduct about 10,000 feet from the elevation reported you very likely will get close to the correct figure.

Yours respectfully,

GEO. L. WEIHLY.

Brooklyn, N. Y., March 29, 1895.

MOONLIGHT SCHEDULE FOR THE UNITED STATES.

[*Issued by the National Carbon Company.*]

MAY, 1895.

Day of Mo.	Light.	Day of Mo.	Extinguish.	No. of Hours.
	H.M.		H.M.	H.M.
1		2	A. M. 4.00	3.20
2	A. M. 12.40			
3	" 1.10	3	" 4.00	2.50
4	" 1.30	4	" 4.00	2.30
5	" 2.00	5	" 4.00	2.00
6	No light.	6	No light.	
7	No light.	7	No light.	
8	No light.	8	No light.	
9	P. M. 7.30	9	P. M. 9.30	2.00
10	" 7.30	10	" 10.30	3.00
11	" 7.30	11	" 11.30	4.00
12	" 7.30	13	A. M. 1.00	5.30
13	" 7.40	14	" 1.10	5.30
14	" 7.40	15	" 1.40	6.00
15	" 7.40	16	" 2.00	6.20
16	" 7.40	17	" 2.20	6.40
17	" 7.40	18	" 2.40	7.00
18	" 7.40	19	" 3.00	7.20
19	" 7.40	20	" 3.20	7.40
20	" 7.40	21	" 3.40	8.00
21	" 7.40	22	" 3.40	8.00
22	" 7.50	23	" 3.40	7.50
23	" 7.50	24	" 3.40	7.50
24	" 7.50	25	" 3.40	7.50
25	" 7.50	26	" 3.30	7.40
26	" 9.00	27	" 3.30	6.30
27	" 10.00	28	" 3.30	5.30
28	" 10.40	29	" 3.30	4.50
29	" 11.00	30	" 3.30	4.30
30	" 11.10	31	" 3.30	4.20
31	" 11.40	June 1.	" 3.30	3.50
	Total			148.20

PERSONAL.

George Westinghouse, Jr., of Pittsburgh, was at the Windsor in New York city last Saturday.

Mr. J. J. Wood, of the Fort Wayne Electric Corporation, Fort Wayne, Ind., visited New York last week.

Mr. F. S. Terry, of the Sunbeam Lamp Manufacturing Company, Chicago, was among the visitors to New York last week.

Mr. C. B. Price, of the highly successful electrical house of Pettingell-Andrews Company, Boston, was a New York visitor last week.

Mr. George A. McKinlock, president of the Central Electric Company, Chicago, was a guest at the Waldorf, in New York, several days of last week.

Mr. William H. McKinlock, president of the Metropolitan Electric Company, Chicago, was in New York last week. His wife and family sailed for Europe on Thursday, and will spend a year in Paris.

The Paris *Soleil* says that, contrary to previous reports, the government of France is not inclined to abandon its demand for the extradition from England of Dr. Cornelius Herz, the Panama Canal lobbyist and founder of *La Lumiere Electrique*.

ELECTRIC RAILWAY NOTES.

Officers of electric railway companies are requested to send promptly to the ELECTRICAL REVIEW *notices of meetings, election of officers, declarations of dividends, financial reports and all items of interest in connection with the financial and practical operation of their roads.*

The work of building an electric road between Watkins and Havana, N. Y., will soon be commenced.

The Pennsylvania House last week passed finally the bill authorizing traction and street railway companies to carry freight. The bill passed by a vote of 121 to 15.

The old barns belonging to the Citizens' Railway Company, corner of Grand River and Trumbull, Detroit, Mich., have been torn down and will be replaced at once by a building for electric cars, general offices and waiting rooms.

The Boston *News Bureau* last Saturday printed the following:

A contract has been signed by the three other elevated companies of Chicago with General Electric Company, giving to the latter the order to begin work upon an electric outfit for these three roads if after six months' trial the present electric outfit on the Metropolitan shall be found successful.

By that time it is presumed also that the Manhattan road of New York will have reached a decision in the matter of equipping its road with electricity and it is considered quite certain that General Electric will make a very close bid for it.

An influential deputation from Ste. Rose and St. Martin waited upon the authorities of the Montreal Park & Island Railway, in Montreal, Que., on April 3, with a view to have the company's system extended through the above-named municipalities. Mr. A. J. Corriveau received the deputation.

Bills have been introduced in the Rhode Island Legislature providing a fine of $3,000 or imprisonment for two years in the case of any person who wantonly obstructs any street railway car, disturbs the tracks, cuts wires, pulls down poles, or in any other way destroys the wires and interrupts the business of any street railway, telephone, telegraph or electric lighting company, or who, by public speech, writing, or publication, incites others to such acts. A fine of $100 or a term of 30 days in jail is provided for any person who taps an electric wire and fraudulently uses or wantonly wastes an electric current, or who tampers with or destroys an electric motor.

There was a moster anti-trolley demonstration in South Brooklyn, N. Y., last Wednesday night. It was engineered by a citizens' committee headed by Hugh V. Monahan, a merchant of Fifth avenue, and consisting of many prominent business men of that part of the city. There was a parade through the principal streets and then a mass meeting. A brass band headed the procession, and when it reached the hall there were easily 5,000 persons in line. Only half of that number could enter the building, and an overflow meeting was held on the sidewalk. A number of letters were read from citizens denouncing the trolley accidents. One of the letters was from the Rev. Dr. R. S. Storrs. Dr. Lyman Abbot read a letter from the Mayor of Baltimore, stating that since the adoption of the so-called Baltimore fender only one man had been killed by the trolley in that city, and he was a druken man who had fallen asleep on the track. The Mayor of Newark, N. J., wrote that there had been no fatal accidents in that city since the adoption of the safety fender in use there. During the proceedings the names of Presidents Lewis and Norton and Mayor Schieren were frequently hissed. The meeting organized itself into a permanent committee before adjournment.

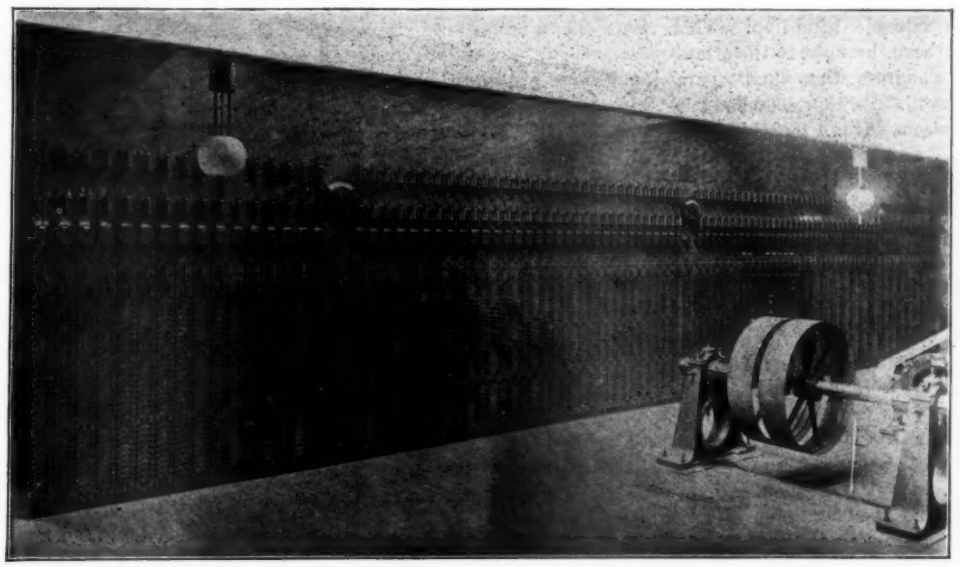

FIG. 5.—THE SWITCHBOARD IN THE CITIZENS' ELECTRIC ILLUMINATING COMPANY'S PLANT, BROOKLYN, N. Y.

FIG. 6.—THE STOCK ROOM AT THE CITIZENS' ELECTRIC ILLUMINATING COMPANY'S PLANT, BROOKLYN, N. Y.

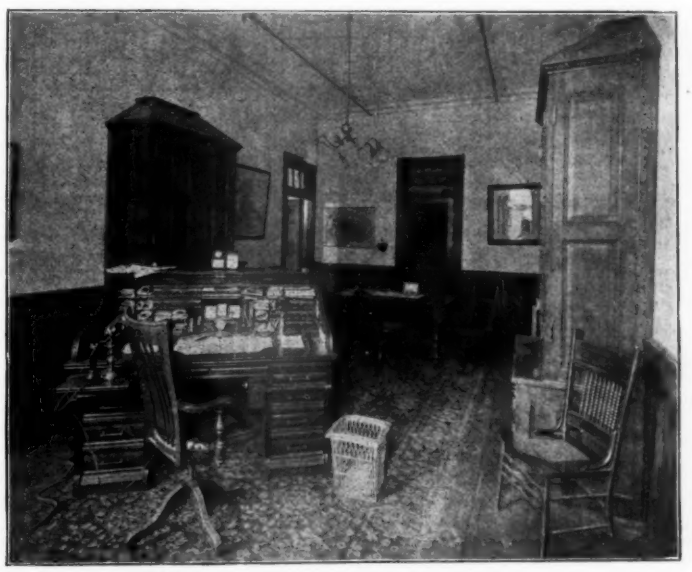

FIG. 7.—GENERAL SUPERINTENDENT E. F. PECK'S OFFICE, CITIZENS' ELECTRIC ILLUMINATING COMPANY, BROOKLYN, N. Y.

PATENT LAWS; THE INVENTOR; THE PUBLIC.

BY R. D. O. SMITH IN "ELECTRICAL ENGINEERING."

I read in the ELECTRICAL REVIEW a communication from Elihu Thomson entitled "An Unjust Statute," and I agree with him entirely as to the allegation, though we should probably disagree as to the element of injustice. I sincerely trust that this decision will so forcibly call public attention to the particular point of injustice that our lawmakers may be induced to give the matter some little of their valuable attention. This point has been brought to the attention of Congress time and again without avail. Perhaps $600,000,000 will be reasons enough for looking at it now.

I think Mr. Thomson labors under an error common among inventors. He appears to regard the patent law as primarily and principally designed for the benefit and protection of the inventor—that the inventor is a sort of "ward of the King."

It may not sound quite complimentary, but it is nevertheless cold fact as well as cold comfort. The law is made for the benefit of the great mass of the people, who are not inventors, but plain citizens, and, so to speak, the law does not care a button whether or not the inventor makes a cent out of his invention. Therefore, the statute does not contemplate the fate of the invention abroad, or take into consideration any differences between our system and enforcible in the other, but it cannot be said that there is any obligation to do so, because the government has no power to create itself a custodian and guardian of the inventor's invention against his will. It cannot compel him either to invent or to disclose his invention, and, therefore, it cannot make itself guardian. All it can do is to offer terms.

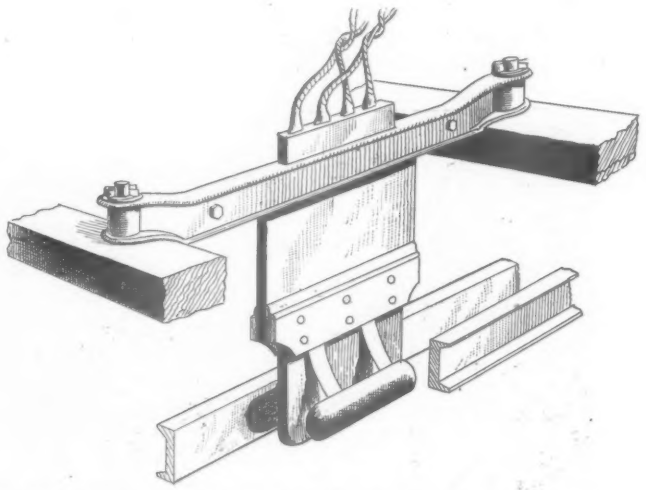

FIG. 1.—UNDERRUNNING TROLLEY TO BE USED ON THE LENOX AVENUE CONDUIT ROAD IN NEW YORK CITY.

If the inventor accepts, well and good; if he does not accept, he simply takes his own risks.

The government cannot guarantee protection, as many think it ought, for the reason that it is physically impossible for the government to know that a certain alleged new invention is not already in possession of the

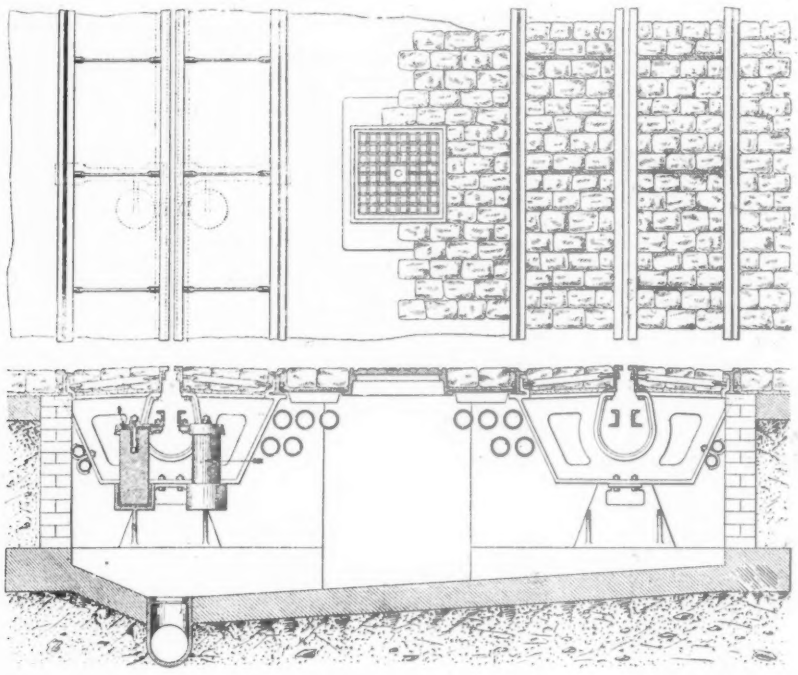

FIG. 2.—PLAN AND SECTIONAL ELEVATION OF THE LENOX AVENUE CONDUIT ROAD IN NEW YORK CITY.

and any other, or any hardships the inventor may fancy he has to endure by reason of the condition of the law.

No nation does more than we do in this regard, and it is quite evident, on a little reflection, that more cannot be done. It is true, two nations may enact the same laws—and they may go farther and agree that a patent issued in one country shall be good people somewhere, and if such shall be the case there is no power in the government to deprive such possessors of their property or rights for the benefit of an inventor who, unfortunately, was not the first.

Inventors are people of the highest possible merit. The people of the United States owe more to them than to all others combined. We may brag of our glorious achievements at arms, in diplomacy, in statesmanship, in the establishment of free institutions, etc., but all of these would have brought forth comparatively small fruit had not our inventors shown us how to pay more for material and more for wages, and still make pretty nearly everything the common world wants at a cheaper rate than any other nation. That is the corner-stone and the hard-pan on which our edifice of greatness rests. Others are as brave, as astute and as free, but in tricks that are not vain the Yankee nation overtops the world.

Still, the government does not, and cannot, make the inventors a special and preferred class—nor do I believe inventors want to be considered in that way. They are possessed of human nature and would always like the best end of the bargain, but that they are not able to take care of themselves none of them would admit. Hence, they ought not to talk as though they were discriminated against and made the butt of unnecessary hardships.

A patent is property, and there is no reason for thinking of it or treating it on a basis different from the basis of any other property. Suppose, as has been more than once proposed, the government should pay the inventor for his invention and make it free to the people. Would any one propose that the government ought also guarantee that the inventor should not lose the money to a sharper, a highwayman, or by bad speculation? Of course not. It would simply turn the property over to him and let him do as he pleases with it. That's what it does now. The courts are open to the inventor just the same as to other men, and it ought not to be forgotten that the patent, which is trimmed down or killed in court, simply stands in the attitude of one who has over-reached the government and got what did not belong to him.

The punishment of the infringer might and ought to be more certain and pronounced. He goes in with eyes open and the risks ought to be proportionate to his expected gains. His means for defeating the inventor by manufactured evidence, or simply wearing him out, ought to be reduced. There is no question that, in practice to-day, the patentee has a harder time in court than any other complainant.

Still, there is no sense in the provision of the law complained of. It seeks to create a relation where no relationship is possible. It would be just as sensible to complain because, per capita, Scotchmen have more oatmeal, or Dutchmen more kraut, than we, as to complain that Englishmen or Frenchmen have a thing patented when we haven't, or *vice versa*. If patents ought to be issued at all they ought to be issued for the benefit of the people of the United States, and with that Englishmen have no concern.

ITEMS OF INTEREST.

The question of what is to become of the American horse since the introduction of the trolley seems to have been solved at last. During the past five months no less than 5,000 have been shipped to Europe to be used, it is said, chiefly for food.

The American Circular Loom Company, of Boston, report business as first-class and orders still coming in faster than they can handle them. Their plant at Chelsea has just been thoroughly overhauled, the machinery put in good shape and every preparation made for an active season. A large order for flexible conduit has recently been shipped to the European agents of the concern in London.

A manifesto from a branch of the Knights of Labor in New York city contains this:

We are making determined efforts to organize the working women here, as they are placed in competition with the sterner sex more and more every day. The only business they have not invaded so far is the climbing of telegraph poles to string wires; but with the advent of the bicycle bloomers there's no knowing what may occur.

THE CONDUIT ELECTRIC RAILWAY ON LENOX AVENUE, NEW YORK CITY.

A PROGRESSIVE STEP BY THE METROPOLITAN TRACTION COMPANY.

It has been known for some time that the Metropolitan Traction Company, of New York city, intended to operate its Lenox avenue line by the underground trolley system. In the ELECTRICAL REVIEW for December 19, 1894, appeared an illustrated description of the work on this road as far as it had then gone. Since December last the temporary power house has been completed, and the plant, as it is up to date, is illustrated and described herewith. The road is so constructed that it can be operated as a cable line should the electric system prove inefficient or undesirable. No pains have been spared, however, to make the installation a success in every respect.

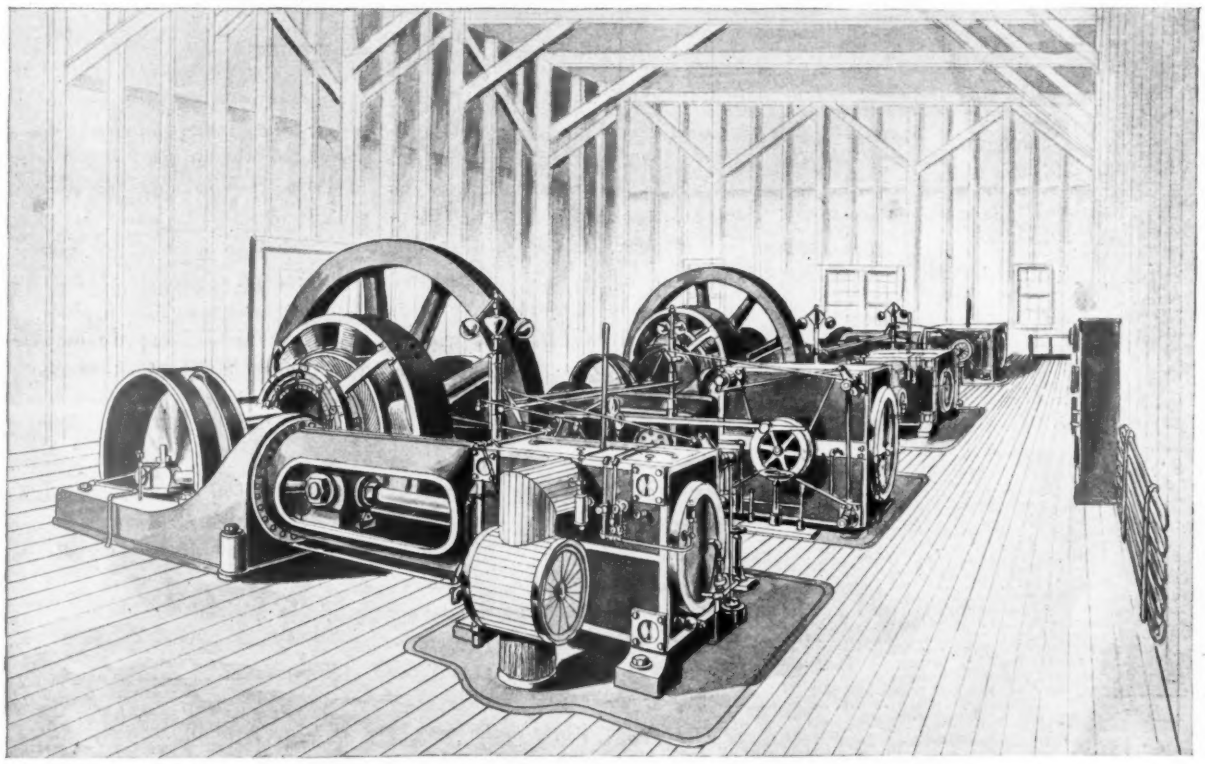

FIG. 3.—INTERIOR VIEW OF THE METROPOLITAN TRACTION COMPANY'S ELECTRIC POWER HOUSE ON 146TH STREET, NEAR LENOX AVENUE, NEW YORK CITY.

The Lenox avenue line is an entirely new double-tracked road. It will connect with the Columbus avenue road at 116th street, and will provide transportation for a district that is now without convenient facilities of this kind. The road extends from the junction of Twelfth and Manhattan avenues, along the former street to St. Nicholas avenue, through that street and 116th street to Lenox avenue, and on that thoroughfare to 146th street. The Lenox avenue part of the line does not pass through a thickly built-up district of the city, but it is believed that when it is provided with good transportation it will be regarded more favorably as a place of residence.

The system installed in Lenox avenue is extremely simple. The installation is, however, by no means without its novel features, but these are matters of detail. It is an open slot conduit with an underground trolley extending from the car through the slot, which is located in the center of the track. A glance at the illustrations will disclose the fact that the system is by no means a reproduction of the Siemens & Halske conduit road in Buda-Pesth.

The track construction, which is of the most substantial character, is similar in every respect to that employed in the company's cable lines, with the single exception that in the Lenox avenue line manholes are built every 30 feet. The sectional view of the track construction at the manholes shows the principal features of the conduit, which it is proposed to use for the electrical operation of the road. In the equipment of the conduit it was determined to dispense with wires altogether. The conductors which will carry the current are four and one-half-inch iron channel bars 30 feet in length. They are supported at each manhole by a soapstone pillar 13½ inches in height and eight inches square. The channel bars are located 11½ inches below the slot rails and are arranged at a sufficient distance away from the slot, so that they will not be affected by any drip entering the conduit from the surface. The soapstone pillar insulators are held in position by cast-iron pedestals secured to the bottom of the manholes. The pedestals are provided with cups or sockets six inches in depth and one inch larger in inside diameter than the soapstone pillars. A space of one-half inch is left, therefore, between the soapstone and the walls of the socket, which is filled with sulphur. On the tops of the insulators are mounted cast-iron caps having brackets on which the conductors rest, being secured by means of bolts passing through the lower flanges.

By this construction and arrangement of conductors it is believed that great advantages will be found in the practical operation of the road. The conductors are sufficiently substantial and rigid, so that it is necessary to support them only at the ends of every 30 feet. According to this arrangement insulators are located only at the manholes, so that these points, at which trouble is most likely to occur, are very easy of access. It is believed that the use of channel bar conductors and the consequent ease of access of insulators will obviate many of the difficulties attending the use of wire conductors in conduits. Because of the stretch of the wires much more frequent supports are necessary, and by the consequent multiplication of these points of attachment the danger of leakage and breaking of insulators is greatly increased. The five pipes represented on the side of each yoke nearest the center of the tracks in the sectional view of the conduit are designed for feed wires. The other pipes indicated in the same view are intended for signal wires. The manholes in which the insulators are located are four feet four inches in depth, four feet in length and 14 feet five and one-half inches in width; that is, the entire distance of the two tracks. They are constructed of brick with eight-inch walls that rest on concrete foundations. The floors are laid with six inches of concrete and are provided with drains for carrying off water. With this provision for drainage no trouble from water in the conduit will, it is believed, be experienced. The conduit was built along the grade of the street, but the pitch is sufficient, however, so that any water flowing into the conduit will find its way into the manholes, which are located every 30 feet, and thus escape.

A sketch of the under-running trolley that is to be employed on the system is shown in Fig. 1. It is simple in construction and consists of a five-eighth-inch steel bar, provided at its lower end with outwardly pressing springs, which are secured to positive and negative contact shoes. The trolleys are bolted to the cross-bars which are attached to the side frames of the car truck.

The station, which for the present will supply power for the line, is a temporary wood frame structure inclosed with corrugated iron. It is located on 146th street, west of Lenox avenue. The present power equipment consists of two cross-compound engines of 1,000 horse-power each, directly coupled to General Electric 300-volt multipolar generators. Steam is supplied by two water tube boilers. During the trial runs of the railway system engines will be run non-condensing. All of the steam pipes and the wiring are located under the floor of the engine room. The feed wires, which are of 500,000 circular mils capacity, enter a subway from the basement of the power house. The subway is located under the sidewalk on 146th street, and extends to the corner of that street and Lenox avenue, where the feed wires are carried through the five-inch iron pipes provided for the purpose in the conduit.

For the present, during the trial runs on the road, the line will be operated directly from the station. If the drop in the voltage proves to be too great, feed wires will be extended through the pipes provided in the conduit for this purpose and will be tapped into the channel bar conductors at suitable intervals. With the 300-volt current which is to be used on the line a greater amount of copper is required for the feed wires than is necessary for the ordinary 500-volt trolley systems.

The only change necessary to make the standard cable trucks under the cars suitable for the electrical service was the addition of supports for the motors. The cars are to be lighted by nine incandescent lamps arranged in groups of three each. Two cars have already been equipped and it is stated that the company has 20 more which will be put into service as soon as the success of the system has been demonstrated. A car barn similar in construction to the power house has been built at the corner of 146th street and Lenox avenue. The building is provided with four tracks and has a storage capacity for about 20 cars. The tracks are provided with pits for the examination of the trolleys and motors.

It is stated that in case the operation of the electric conduit system proves successful the power plant will be increased by the addition of three direct connected units of 1,500 horse-power each, making the total capacity of the station 5,000 horse-power. In this event, the present unprepossessing temporary structure will be replaced by a handsome brick building for a power plant, car house and repair shops. All the work on the Lenox avenue system has been executed under the direction of F. S. Pearson, chief engineer of the company, and the architect of the new building is A. B. Porter.

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CONTENTS.

	PAGE
Views, News and Interviews	199
The New Station of the Citizens' Electric Illuminating Company, of Brooklyn, N. Y.	199
The Mountains of Australia	200
Moonlight Schedule for the United States	201
Personal	201
Electric Railway Notes	201
Patent Laws; The Inventor; The Public	202
Items of Interest	202
The Conduit Electric Railway on Lenox Avenue, New York City	203
Trolley Law	204
Blow Your Horn	204
Wall Street and the Electrical Stock Market	205
Our Boston Letter	205
Death of George M. Phelps	205
Telephone News and Comment	206
The Washington Conduit Road	206
American Institute of Electrical Engineers	206
Crocker-Wheeler Electric Company	206
Field Engineering Company Embarrassed	206
A Four Thousand Horse-Power Goubert Heater	207
Receiver for the Mather Electric Company	207
The Minimum Current Audible in the Telephone	207
An Electric Infantry Rifle and Its Marvelous Range	207
The First Electrical Clinic in America	207
Removal Notices	207
Telephones in England	208
A New M. & B. Telephone	208
Obituary	208
Electric Light Flashes	208
Lundell Alternating Fan Motor Outfits	209
Wilkinson's Oiling Devices	209
The Capacity of Conductors Carrying Current	209
The Trolley in Connecticut	210
A Two-Hundred-Kilowatt Generator for Electrolytic Work	210
A New Telegraph Sounder	211
Literary	211
Electric-Lighted Signs	211
Kind Words	211
Massachusetts Electric Lighting Statistics	211
Who Makes This Machine?	211
Kindred Interests	212
Electrical Patents	xi
Advance Information	xii

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
Abendroth & Root Mfg. Co., boilers	xviii
American Electrical Works, insulated wire	i
Ansonia Brass & Copper Co., wire	xviii
Armington & Sims, engines	xviii
Boudreaux Dynamo Brush Co., a new foliated anti-friction metal brush	i
Bunnell & Co., J. H., dry batteries	i
Day's Kerite, insulated wire	i, x
Eastern Electric Cable Co., insulated wire	xviii
Globe Electric Light Co., incandescent lamps	i, v
Goubert Manufacturing Co., heaters	xviii
Hammond Cleat and Insulator Co	i
Hampson, E. P. & Co., engines	xviii
Law Battery Co., open circuit batteries	i
McKenney & Waterbury, lamps and fixtures	i
Morris, Tasker & Co., tubes, poles, etc	xvii
New Haven Car Register Co	xvii
Okonite Co., insulated wire	i, xviii
Partridge Carbon Company, motor and generator brushes	i
Rhode Island Tool Co	xviii
Safety Insulated Wire and Cable Co	i
Standard Underground Cable Co	i
Stewart, F. H., & Co., knife switches	i
Stirling Co., water tube boilers	xviii
Westinghouse Electric & Manufacturing Co., Tesla patents	ii
Weston Engine Co., engines	i

INSIDE PAGES.

Adler Veneer Seat Co., electrical tables	xi
American Bell Telephone Co	xv
American Electric Telephone Co., long-distant telephones	xv
American Watch Tool Co., bench lathes	xvi
Bain, Forée, electrical engineer	xii
Baker & Co., platinum	xv
Belden Machine Co., drop forging	xv
Belden & Seely, railroad contractors	x
Benjamin, Geo. H., patents and patent law	xii
Bernstein Electric Co., incandescent lamps	iv
Bickford & Francis Belting Co., leather belting	xvi
Bishop Gutta Percha Co., wires and cables	v
Bradbury-Stone Electric Storage Co., storage batteries	xii
Brill, J. G., Co., railway cars	xv
Brixey, W. R., Day's kerite wires and cables	x
Brodie Electric Co., automatic motor switches	x
Brown & Sharpe Mfg. Co., machinery and tools	xvi
Brush Electric Co., arc lamps	vi
Central Electric Co., okonite wire, etc	iii
Chapin, Chas. E	xi
Clonbrock Steam Boiler Works, steam generators	vi
Colgate Company, Geo. L., lightning arrester	212
Connecticut Pipe Mfg. Co	vi
Consolidated Electric Storage Co., batteries	xii
Crocker-Wheeler Electric Co	211
Cutter Electrical and Mfg. Co	xvi
Darlington, F. W., consulting engineer	212
Davis, B. C., counsellor at law	xvi
De Veau & Co., telephones	xi
Dixon, Jos., Crucible Co., belt dressing	vii
Duval, Edward S., Jr., patents	xi
Dynamo-Electric Maintenance Co	iii
Eddy Electric Mfg. Co., Eddy generators	xiii
Edson, Jarvis B., steam pressure recording gauges	vi
Electrical and Mechanical Engineering and Trading Co	iv
Empire China Works, porcelain specialties	212
Euler, H. C., mother-of-pearl	211
Eureka Compound Co	xvi
Falls Rivet & Machine Co., friction clutches	iv
Faraday Carbon Co., carbons	xi
Forest City Electric Works, commutator bars	xii
Fort Wayne Electric Corporation, Wood electric light apparatus	viii
For Sale, two 40 horse-power Otto gas engines	212
Garlock Packing Co	vi
Garvin Machine Co., machine tools	xv
General Electric Co., Edison incandescent lamps	v
Globe Electric Light Co., incandescent lamps	v
Globe Metal Works, refiners of platinum	iv
Harrisburg Foundry & Machine Works, ideal engines	iv
Harrison, W. P., & Co., plaiting dynamos	xii
Hart & Hegeman Mfg. Co., snap switches	xvi
Helios Electric Co., arc lamps	vii
Hooven, Owens & Rentschler Co., electric railway and electric light engines	iii
Interior Conduit and Insulation Co., Lundell dynamos and motors	xvi
International Correspondence Schools	212
Keasbey & Mattison Co., magnesia sectional coverings	xiii
Lane & Bodley, street railway engines	iv
Large & Twining, switches	iii
Leclanché Battery Co., batteries	xvi
Lehigh Valley Creosoting Co., creosoted lumber	xii
M. & B. Telephone Co	viii
Manning, Maxwell & Moore, tools and supplies	xvi
Marshall Wm., condensers	xiii
Mather Electric Co., power generators	2.2
McIntire, The C. Co., connectors and terminals	211
Metropolitan Chandelier and Electric Supply Works	212
Metropolitan Electric Co., supplies	xv
Metropolitan Telephone and Telegraph Co	x i
Moore, Alfred F., insulated electric wire	xv
Morris & MacCurdy, insulating paint	xi
National Telephone Mfg. Co., Desk sets	xiii
New England Engineering Co	x v
New York Belting and Packing Co., rubber belts	xiv
New York & New England R. R	xv
New York & Ohio Co., Packard lamps	xiii
Ostrander & Co., W. R., supplies	xii
Partrick & Carter Co., electrical supplies for housework	211
Penberthy Injector Co	xvi
Perkins Electric Switch Mfg. Co., switches and sockets	xvi
Phillips Insulated Wire Co., wire	x
Pope, Reed & Rogers, patents	211
Proposals for Lighting city of Sheboygan, Wis	211
Receiver's Sale	212
Riker Electric Motor Co	xvi
Royce & Marean, electrical supplies	xii
Safety Car Heating and Lighting Co., pintsch system	iv
Scott Electric Lamp Co., search lights	iii
Self-Winding Clock Co., clocks	xvi
Smith, Jas., Woolen Machinery Co	xvi
Solar Carbon and Mfg. Co., carbon specialties	xvi
Sprague, T. W., consulting engineer	xii
Standard Paint Co	x
Standard Thermometer Co., arc lamps	iv
Stanley Electric and Manufacturing Co	vii
Stanley & Patterson, electrical supplies	212
Stevens, H. L. C., photo-engraving	xii
Syracuse Storage Battery Co	xii
Varley Duplex Magnet Co., magnets	xii
Walker Mfg. Co., car trucks	xiv
Washington Carbon Co., Helios cored carbons	iii
Western Electric Co., supplies	xiv
Western Telephone Construction Co., telephones	xv
Westinghouse Electric & Mfg. Co	ix
Weston Electrical Instrument Co., measuring instruments	x
White-Crosby Co., contracting engineers	211
Wilkinson, W. H., automatic wiping device	212
Williamsport Wooden Pipe Co., creosoted conduits	xvi
Worthington, H. L	212

The success of the Lenox avenue conduit road in New York city, which is fully described and illustrated in this issue of the ELECTRICAL REVIEW, will lead to results unusually favorable to electric traction. The overhead trolley system seems to be effectually barred out of New York, and the advocates of electric rapid transit are forced to content themselves with an experiment in the more expensive form of an underground electric system. That the trial of this road will bring out the best points of conduit construction is conceded.

TROLLEY LAW.

Ever since the great strike on the Brooklyn trolley lines the daily papers have resumed their scare headings and are again running amuck with blood-curdling rhetoric and the tiresome cry "down with the trolley," "stop the Juggernaut," etc., and now the cry is heard in the legislative halls, and all sorts of absurd bills have been introduced to stop the killing and maiming; bills which do not aim at the source even remotely. As well proceed to fell an oak by cutting off its top, or tunnel the Palisades by ordering a gimlet.

It is not high speed, and, generally, not reckless negligence, nor the absence or inefficiency of fenders, which cause the bulk of these accidents, and no amount of legislating will prevent a continued repetition of them. We have before referred to this subject and suggested a remedy which would absolutely prevent a majority of these sad accidents. We refer to it again, and beg our legislators to look into the matter, feeling confident our suggestion aims at the root of the difficulty, and this once extirpated but few accidents will be chronicled.

Looking at the facts it will be found that a great proportion of the accidents have happened to young children, ranging from two to six or seven years of age, who are permitted by their parents to wander at will, play on the streets with no one to watch over them or guide their unthinking steps. Those children have no idea of the frightful danger they incur; they are too young to be impressed by any warning, and too often their parents fail entirely even to try to educate them to the sense of danger. Those parents are criminally negligent, for they know the danger and all the possibilities; but even they do not stop to think. So long as children are allowed to play on the streets, just so long will the accidents happen. What avail for a motorman to put on brakes and reverse motors when a child, whose hat has blown across the street, suddenly darts after it when the car is not ten feet away? A second before the track was clear. A second later and a horrible accident has occurred. The motorman was exercising due caution, was running not faster than the law permits. A fender is of little use when used upon a tender child. It may possibly keep the child from the wheels, but death lurks as well in the dragging and bumping which are inevitable.

Pedestrians, whether young or old, have the right of way at crossings, but neither old nor young have any right to play upon the streets, and we fail to find a court decision allowing damages to parents of a child injured by a vehicle when the child was running about playing on a street where vehicles passed frequently. Contributory negligence by the parents has always proved the bar to damages in such cases.

Then why discriminate against the electric railway companies? Is not the parents' negligence even more culpable, knowing as they do that the cars come along frequently, that the rails may be slippery and the brakes slow to check the car under such condition; that children are creatures of impulse and liable any instant to run in front of a car?

Let the trolley system be surrounded with all reasonable safeguards by all means, but give them a fair chance. Let us have legislation aiming at one of the main roots of the evil, a law holding the parents responsible for all injuries sustained by their children when playing or wandering on the streets. Let them be compelled to confine their children to the sidewalks. Let such a law be enforced by suitable penalties, and at once the chief cause of trolley accidents will disappear.

Here is an opportunity for our great newspapers to do some really humane work in advocating some such law as will keep the poor innocents out of harm's way, at least so far as cars and other vehicles are concerned. Such a law would meet with general approval, as it would be humane, effective and would clash with no private or individual interest whatever.

BLOW YOUR HORN!

The conclusion of a recent editorial in the New York *Sun* was as follows:

As soon as a scientific man, or any other man, makes a discovery, and is perfectly sure of its newness, its importance and its demonstrability, he ought to stride into the open and make announcement of it, rather than to conceal it until somebody else lays claim to its authorship. We heard of a man the other day who made a discovery, or rather an invention, in which there was money, yet he died in poverty because he did not take the trouble to blow his own horn.

This is true and practical advice, and is applicable to electrical inventors as well as others. It is a part of the business of the ELECTRICAL REVIEW to serve the inventor and the public in just this way, and we want that fact taken advantage of even more than it has been in the past.

Wall Street and the Electrical Stock Market.

Railroad stocks were neglected during the week closing to-day and the moderate activity was monopolized by the industrial shares. The strength of this class for a number of weeks past created the general feeling that there is something behind the movement beside mere manipulation. It has been taken as reflecting an improvement in trade and is regarded as a harbinger of better times. The advance has been quite general, although in most cases moderate. It is attracting attention and will eventually do much to widen the general market. The activity and strength in railroad bonds has been another encouraging feature, as it reflects the disposition of money towards investment. Trade reports continue to show moderate improvement, and altogether the outlook is promising.

General Electric suffered one or two setbacks of a speculative nature, but only temporarily lost ground. There was the usual raft of published rumors regarding the progress of negotiation between the company and Westinghouse. It is a strange coincidence that the character of the news in this instance as well as in others where the electrical companies have been concerned is varied according to the market interests on certain brokers who are active in this class of stocks. And stranger still is the fact that certain industrial papers have been active on the dissemination, and in instances have been known to send out advance sheets to the daily press with a view of reaching the public when they needed "enlightment" before the regular edition went to press. In this connection it is perhaps pertinent to call attention to an old axiom of Wall street newspaper men, viz., "A financial report edited in a broker's office is seldom, if ever, fair and unprejudicial." But to return to General Electric. I am told that negotiations are progressing and that their consummation is only a question of time. No one in the street believes that the deal will involve anything more than a termination of litigation and an agreement to stop cut-throat competition, sufficiently fortified to render its enforcement certain. As for prices, they will not be advanced beyond a figure affording a fair profit margin. Such an act would foster competition in various departments of the electrical field, rearing opposition that would be formidable if not dangerous. The managements of each company fully realize this fact through bitter experience, which they do not care to repeat. The General Electric Company will hold its annual meeting at Schenectady, May 14. Directors to the number of 13 are to be elected. The management asks for proxies in the names of Oliver Ames, 2d, Henry L. Higginson, F. S. Hastings and J. H. Ord. I have heard of no opposition and do not believe there will be any.

The advance of nearly 100 per cent in North American in two weeks has been a nine-day wonder to the Street. The property is but a shadow of past greatness, its only remaining assets are the Cincinnati and Milwaukee electric plants. It has been felt all along up to a recent date that the latter was in danger of being lost through debts. It now transpires that the debts have been funded and the company is to retain control of the Milwaukee plants.

Brokers making a specialty of high priced inactive industrial securities report an excellent demand for Commercial Cab'e. The bid price is 137, and there are practically no offers. Postal Telegraph continues strong at 68 bid and 69 asked. The demand for the high-priced stocks and bonds of street railways of this and other cities has been unusually good of late. It has not affected prices, however, as they are now so high as to be controlled by the interest rates for money. The yield is from 3 to 5 per cent. Purchasers of these securities govern their operations by the rate they are willing to accept for money; consequently as money stiffens, as it must upon a general trade revival, prices of these securities will naturally sell off.

On the Boston Exchange, Bell Telephone reflected the publication of the Standard scheme in the early trading, declining on Monday to 176. It reacted to 182 the latter part of the week. Despite the weakness the transactions were limited, amounting to less than 5,000 shares. Electric Storage Battery was firm at 30. Erie Telephone lost one point to 52. New England Telephone reflected expected competition and the voluntary cut in rentals by dropping to 67 from 71. Westinghouse was firm to strong at 33½ to 34½ for the common, and 51¾ to 52½ for the preferred.

BAIN.

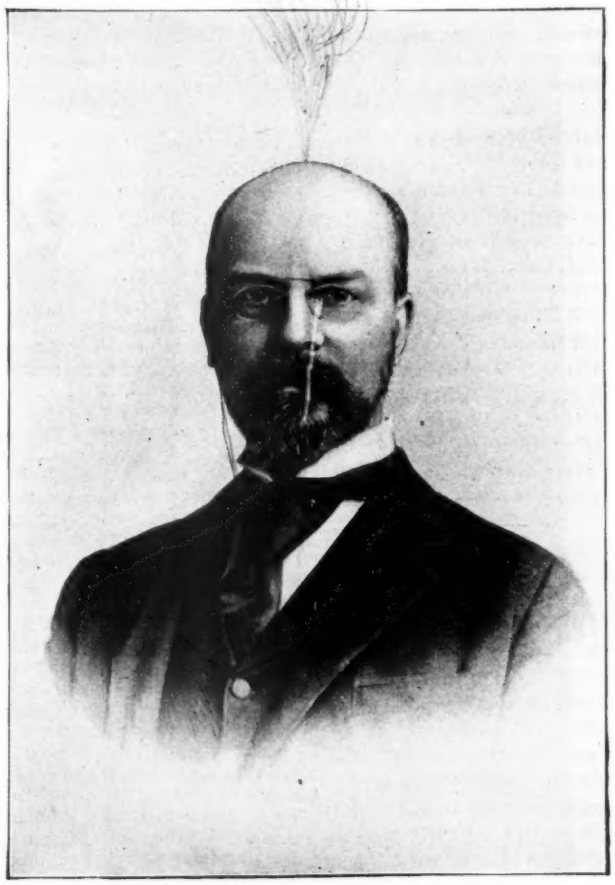
New York, April 13, '95.

OUR BOSTON LETTER.

Chas. E. Bibber, of the firm of Bibber, White & Company, of this city, has recently been appointed New England manager for the Columbia Incandescent Lamp Company, of St. Louis, and the Wagner Electric Manufacturing Company, also of St. Louis. Additional offices have been opened at 620 Atlantic avenue, and ample storage facilities engaged for carrying a full line of Columbia lamps and the Wagner company's transformers and motors. This will enable them to fill orders promptly in this territory and will prove a great convenience to their many customers. In addition to the above, the firm of Bibber, White & Company are general sales agents for the Cutter Electrical and Manufacturing Company, of Philadelphia, and the Crefield Electrical Works, whose factory is now in active operation, and they are prepared to fill orders for high grade rubber covered wires and cables for underground work, of which they make a specialty. Bibber, White & Company are a progressive concern who believe in turning out a first-class line of goods and getting a fair price for them, a policy which in the end will win every time. We hear too much talk nowadays about the wholesale slaughtering of prices and the inability of large concerns to dispose of their goods except at a loss. A first-class article always can and will be sold, and the ones who make the loudest outcry to the contrary are, nine times out of ten, the leaders in a cut of prices. Bibber, White & Company, at any rate, believe in doing business on legitimate lines, and that their policy is the correct one their rapidly-increasing trade will testify.

H. G. T.

Boston, April 13.



GEORGE MAY PHELPS, DIED APRIL 11, 1895.

Death of George M. Phelps.

George M. Phelps, president of *The Electrical Engineer*, Incorporated, died of pneumonia at his home in Brooklyn, N. Y., on Thursday, April 11. He caught a severe cold on the previous Friday, but was at his office on Saturday. That afternoon he went home and called in a physician, who discovered that the cold had developed into pneumonia. Mr. Phelps' work on his paper had been unusually confining of late and he was not in the best of health. Funeral services, which were largely attended by prominent electrical people and others, were held at Mr. Phelps' late residence, in Brooklyn, last Saturday evening. The interment was at Troy, N. Y., on Sunday.

George May Phelps was born at Troy, N. Y., in 1843 and was the son of the late G. M. Phelps, the well-known electrical inventor, who invented the Phelps ticker, the Phelps telephone and other devices. The Western Union Telegraph Company acquired the patents for these inventions, which are still in use by them. Mr. Phelps secured his early education in the public schools and high school of Troy.

Since 1861, excepting an interval of five years, Mr. Phelps had been engaged in electrical interests; first in the shop of the American Telegraph Company, of which his father was superintendent from the organization of the company till its absorption by the Western Union Company, in 1866. Afterwards he served from 1863 to 1866 in the auditing department of the American Telegraph Company. From 1871 till 1879 Mr. Phelps was assistant to his father in the conduct of the Western Union Company's factory in New York. When in April of the latter year the telegraph company gave up its own manufacturing and disposed of its factory to the Western Electric Company, he was appointed superintendent of the factory by the latter company, which position he held till December, 1885. Early in 1886 Mr. Phelps joined Mr. Franklin L. Pope in conducting *The Electrician and Electrical Engineer*, then published monthly and acquiring a proprietary interest in that journal soon after. When the *Electrical Engineer* was expanded to a weekly and its business incorporated, he became and was at his death president of the corporation.

He was a charter member of the American Institute of Electrical Engineers, and was elected one of its managers on May 19, 1885. He served on the council in this capacity until his election as treasurer on May 17, 1887, to which office he has been re-elected each year, and which he held at the time of his decease. He had been nominated for the same office by the council for the term beginning May 14, 1895. He was a member for many years and at his death of the Hamilton Club, Brooklyn, and the Reform Club, New York.

In the death of Mr. Phelps, technical journalism loses an honorable and able member. The ELECTRICAL REVIEW sincerely regrets his death and extends sympathy and condolences to the grief-stricken daughter and sister who survive him.

TELEPHONE NEWS AND COMMENT.

Warsaw, N. Y., is talking of a local telephone exchange.

Kansas City, Mo., is now connected with Plattsburg, Mo., by telephone.

Jean DeKolty has secured a 20-year telephone franchise at Albia, Ala.

Local capitalists at Marshalltown, Ia., are organizing a telephone company.

Arrangements are practically completed for a telephone line from Fargo, N. D., to Grand Forks.

It is said that a new telephone company at La Crosse, Wis., secured 200 subscribers in two weeks.

Erie Telegraph and Telephone stockholders are exempt from the income tax as the tax is paid by the corporation.

In spite of continuous reductions in private line rentals, the earnings from this source by the New England Telephone and Telegraph Company increased from $22,077 in 1888 to $30,701 in 1893.

The Erie Telegraph and Telephone Company made a net gain in January and February of 152 new subscribers, bringing number connected up to 16,326. The March gain will be larger in proportion.

The new aerial and submarine cable put in by the Duluth Telephone Company from shore to shore over the Northern Pacific bridge, connecting Duluth, Minn., and Superior, is now in successful operation.

People interested in the establishment of a new telephone exchange in Columbus, Ohio, are in communication with prominent Columbus attorneys concerning the enterprise. The preliminary steps are well under way.

The annual meeting of the International Bell Telephone Company, Limited, will be held in New York city May 1, and immediately after a special meeting will be held to reduce the capital stock to $1,000,000. The authorized capital is $1,700,000.

The Holland, Mich., Telephone Company has been organized with local capital to furnish telephones at $12 per year for residences and $18 for business houses. The Bell exchange at Holland has cut rates from $48 to $12 per year for all purposes.

The New England Telephone and Telegraph Company has reduced the annual rental of private telephone lines, with two sets of instruments, between the Stock Exchange and members' offices within the Exchange Building in Boston to $16.50 per annum.

The New England Telephone and Telegraph Company has bought the line running from Rumford Falls, Me., to Canton, and will immediately equip it for long-distance service. It is planning also to do considerable construction work during the coming year in the vicinity of Calais.

The Central Union Telephone Company, at Laporte, Ind., has announced a schedule of rates reducing the price for business houses to $1 a month and fixing a rate of 67 cents for residences. This is to meet the competition at Michigan City, Ind., resulting from the opening of an exchange by an opposition company.

Samuel H. Mildenberg, the representative of the New York and Eastern Telephone and Telegraph Company, of Brooklyn, N. Y., said last Wednesday morning: "I have just signed a contract for a large amount of wire, and we will begin work as soon as we can. We are negotiating for the purchase of a building upon which we took an option last Fall."

The contract between the Western Union and the Bell Telephone Company expires in November, 1896, when the latter will use its wires for telegraphing as well as telephoning. It is stated on very good authority that at this early date a representative of the Bell Telephone Company has approached several of the great newspapers, who are liberal patrons of the telegraph companies, seeking to find out when their contracts will expire, and assuring them that for greatly reduced rates they can have equally good service.—*The Fourth Estate.*

The Chicago Telephone Company will have in operation about May 1 a schedule of rates as low as $5 a month available, it is estimated, for at least 25 per cent of the total number of its present patrons. The cut is to be accomplished by the creation of new "party circuits." General Manager Hibbard says that the rates will be on a sliding scale. Where there are two instruments on the circuit the rent will be $75 yearly; for three the cost to each will be $70, and where there are four or more the rate will be $60. By this means he expects to increase the residence patrons from 3,000 to 6,000. In the business section hundreds of new subscribers are also expected to come in on the "party circuits."

The Brooklyn, N. Y., Board of Aldermen, last week, by a decisive vote, overrode two vetoes of Mayor Schieren, directed against the New York and Eastern Telegraph and Telephone Company, which has been trying hard for over a year to get a foothold in that city. One veto was of a resolution giving the company permission to connect its wires with the City Hall, municipal and other public buildings, and the other of a resolution giving the company the special privilege of stringing its wires on the poles of the fire department. Mayor Schieren based his objection to the action of the aldermen on the ground that the company had not got the consent of the Subway Commissioners. Both vetoes were set aside by a vote of 13 to 5.

The Virginia Legislature has granted a charter to the American Telephone Company of Virginia. Under an ordinance recently adopted by the council, the exclusive franchises that the Southern Bell Telephone Company has always enjoyed in Richmond will, it is said, expire in about nine months. Then the field will be open for competition, and the Southern will either have to make terms for the renewal of its privileges or to fight for its further existence. The service in Richmond is reported to be exceptionally good, considering the great number of electric wires on the poles, but there is complaint about the prices. The rental in Petersburg has been greatly reduced, but a cheaper instrument is in use there. The newly chartered company proposes to make immediate application for the right to do business.

In the course of the reply of Prof. D. E. Hughes, F. R. S., to the toast of "Our Guests" at the banquet given by the staff of the National Telephone Company, in London, on March 15, he said:

The earliest record of a perfect theoretical electric telephone was contained in Du Moncel's "Exposée des Applications," Paris, 1854, when M. Charles Bourseul, a French telegraphist, conceived a plan of conveying sounds and speech by electricity. "Suppose," he exclaimed, "that a man speaks near a movable disk sufficiently flexible to lose none of the vibrations of the voice, that this disk alternately makes and breaks the current from a battery; you may have at a distance another disk which will simultaneously execute the same vibrations." Unfortunately M. Bourseul did not work out his idea to a practical end, but in these few words we have the shortest possible explanation of the theory of our present telephones. It is now exactly 30 years since my first experiments with a working telephone, for in 1865, being at St. Petersburg in order to fulfill my contract with the Russian Government for the establishment of my printing telegraph instrument upon all their important lines, I was invited by his Majesty the Emperor Alexander II to give a lecture before his Majesty, the Empress, the Court at Czarskoi Zelo, which I did, but as I wished to present to his Majesty not only my own telegraph instrument but all the latest novelties, Prof. Philipp Reis, of Friedericksdorf, Frankfort-on-Main, sent to Russia his new telephone, with which I was enabled to transmit and receive perfectly all musical sounds, and also a few spoken words, though these were rather uncertain, for at moments a word could be clearly heard, and then from some unexplained cause no words were possible. This wonderful instrument was based upon the true theory of telephony, and it contained all the necessary organs to make it a practical success. Its unfortunate inventor died in 1874, almost unknown, poor and neglected, but the German Government has since tried to make reparation by acknowledging his claims as the first inventor and erecting a monument to his memory in the cemetery at Friedericksdorf.

The Washington Conduit Road.

To the Editor of Electrical Review:

In looking over the April 10, 1895, issue of your valued paper, I was very much surprised at the article on page 193. The only conduit electric railroads in Buda-Pesth were built by Siemens & Halske. We are not doing any work in Washington and no one in Washington has obtained any rights from us to use our patents. Your article is, therefore, misleading to the public, and I am surprised that you would publish such information. This statement has been made a number of times before regarding this road. If it be true that the Metropolitan Street Railroad Company contemplate using our patents, they will have to settle with us. If they are not contemplating using our patents, I object to the statement that their road is the same as those in Buda-Pesth.

Yours truly,
Augustine W. Wright,
Vice-president Siemens & Halske Electric Company of America.
Chicago, Ill., April 11, 1895.

American Institute of Electrical Engineers.

The ninety-sixth meeting of the Institute will be held at 12 West Thirty-first street, New York city, on Wednesday, April 17, at 8 P. M. A paper will be presented by Prof. Edwin J. Houston and Mr. A. E. Kennelly, of Philadelphia, on "Resonance in Alternate Current Lines." A paper will also be presented by Prof. W. A. Anthony, of New York city, on "Underwriters' Rules."

A meeting of western members will be held the same evening, Wednesday, April 17, 8 P. M., at Armour Institute, Thirty-third street and Armour avenue, Chicago, where the above papers will be read and discussed.

The council has voted to hold the general meeting for the reading and discussion of papers, at Niagara Falls, beginning Tuesday, June 18. Full particulars will be given later.

Crocker-Wheeler Electric Company.

The Crocker-Wheeler Electric Company, whose manufacturing plant at Ampere, N. J., was almost totally destroyed by fire a week ago, has made rapid progress in getting order out of chaos and is now making shipments of apparatus. The pattern shop was saved, and by roofing over about 100 feet of one of the burned buildings the company has made facilities which will enable it to carry along its manufacturing business temporarily. It is hoped to have a complete new plant, better than the old one, in operation by July 1.

Field Engineering Company Embarrassed.

Deputy Sheriff Mulvaney last Friday received an execution for $3,289 in favor of the General Electric Company against the Field Engineering Company, of 143 Liberty street, New York city.

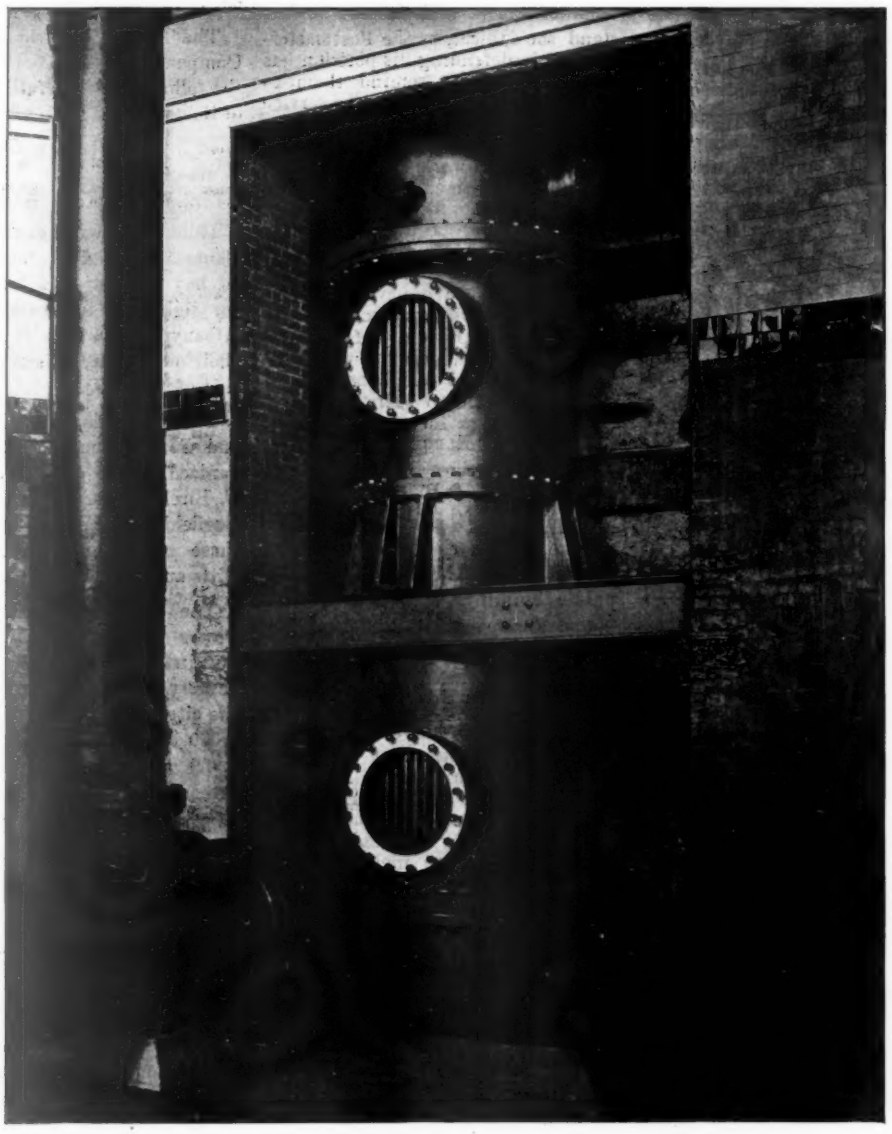
A Four Thousand Horse-Power Goubert Heater.

The Goubert Manufacturing Company, located at 14 and 16 Church street, New York city, has recently installed at the first district station of the Edison Electric Illuminating Company in Pearl street, Brooklyn, N. Y., a 4,000 horse-power vertical Goubert feed-water heater. A good view of this immense heater, one of the largest ever built, is shown in the engraving on this page. It is a most perfect piece of work and designed expressly to fit into the limited space available.

The heater is made entirely of cast-iron and brass, and is of the latest improved Goubert type with curved upper and lower tube plates and patent flexible expansion joint. This is the only joint in the heater that is not rigid, the differential expansion between the shell and the brass tubes being taken care of at this point.

The Goubert heater is especially desirable in connection with plants of magnitude and heavy duty; in fact it is the only one made for the high pressures that are now so frequently used.

The Goubert Manufacturing Company is doing an extensive business in large units, especially for electric plants, both lighting and traction, operated by the principal companies throughout the country. It now has branch offices in many of the principal cities.



A Large Goubert Feed-Water Heater.

Receiver for the Mather Electric Company.

Mr. Charles M. Jarvis has been appointed receiver of the Mather Electric Company, of Manchester, Conn. The company states that the receivership is a friendly one. Mr. Jarvis is a larger stockholder and a director of the company, and his appointment was applied for by a vote of the board of directors. The assets of the company are reported to be in excess of its liabilities, but it has been doing for some months a business that was larger than its capital warranted. The capital of the company is $216,000, and the officers are: Vice-president, Thomas C. Perkins; secretary and treasurer, John L. Bunce; directors, C. E. Perkins, Charles M. Jarvis, Henry A. Redfield, George H. Day, Thomas C. Perkins, John L. Bunce.

Mr. Perkins states that the directors anticipate that the receivership will not in any way affect the business or the manufacturing end of the company, and that the factory will keep right on taking orders.

The Minimum Current Audible in the Telephone.

Noting the extreme discrepancies in the results of other observers, Lord Rayleigh considers in the *Philosophical Magazine* that what is required is not so much accuracy of measurement as soundness of method; and he thought that electro-motive forces of the required harmonic type would be best secured by revolving a magnet in the proximity of an inductor coil of known construction. In trying to avoid the effects of self-induction the author encountered those of capacity, and the details of the apparatus used for the purpose of avoiding the difficulty are given. When the magnet was driven at full speed the frequency was 307, and at this pitch the value of the minimum current which produced a sound easily audible after a few seconds was 7.4×10^{-7} amperes, with a resistance of 8,100 ohms; while with a plumbago resistance of 84,000 ohms the current fell to 3.8×10^{-7} amperes. Experiments at higher pitches were made by means of magnetized tuning-forks vibrating with known amplitudes and having their magnetic axis passing perpendicularly through the center of the mean plane of the inductor coil. The sensibility of the telephone was found to rise rapidly from $2{,}800\times10^{-8}$ amperes at a pitch of 128 to 83×10^{-8} amperes at a pitch of 256, and then to rise more slowly till it attained a maximum at 4.4×10^{-8} amperes for a frequency of 640. But the only observation above this frequency, at 768, is more or less difficult to obtain; and further observations would be necessary to confirm the fact of a maximum sensibility at about 640 periods per second. This shows a similar limit of sensibility for galvanometers with direct, and telephones with alternating, currents.

An Electric Infantry Rifle and Its Marvelous Range.

The *Münchener Neuste Nachrichten*, of Munich, Germany, publishes the following:

A mechanic in the employ of the Imperial Gun Factory in Spandau has invented a rifle overshadowing with the results attainable by it everything that has been done of late years in the line of arms and ammunition. It is an electric infantry rifle with a bore only one and one-half millimetres in diameter. The projectile is two and three-fourths centimetres long, made of steel, coated heavily with iridium. The explosive used for this size is a transparent mass of what the inventor claims is nothing else but pure compressed electricity, produced by condensing a static charge under enormous pressure and cold into a jelly-like substance; 20 grains is the charge. At a trial made at Juterbogk in the presence of members of the German general staff a sharpshooter was detailed to try the rifle. Carefully aiming at a target, the center of which was of the exact height and in direct line horizontally with the gun, the man pulled the trigger. The explosion was weak and no smoke was visible. But fancy the horror of the soldiers standing around him when three seconds later the sharpshooter fell down dead. Upon examining him he was found pierced in the back, and on probing the wound the identical iridium-coated projectile was extracted! The terrible conviction then dawned upon the officers of the staff that the projectile had passed clear around the earth, pushed forward by the compressed lightning contained in the cartridge. Since then there has been great excitement around the Imperial War Office at Berlin.

The First Electrical Clinic in America.

The formal opening of the first electrical clinic in America, "The New York Electro-Therapeutic Clinic Laboratory and Dispensary," at No. 327 East Twenty-fifth street, New York city, occurred Saturday evening, April 6. It has been founded by Dr. Margaret A. Cleaves, for electrical treatment of charity patients in all cases traceable to malnutrition.

REMOVAL NOTICES.

The Electrical Review, in accordance with its annual custom, desires all electrical companies and representatives of kindred interests, who contemplate the removal of their factories, main offices or branch offices about May 1, to promptly notify us of the fact for publication.

Telephones in England.

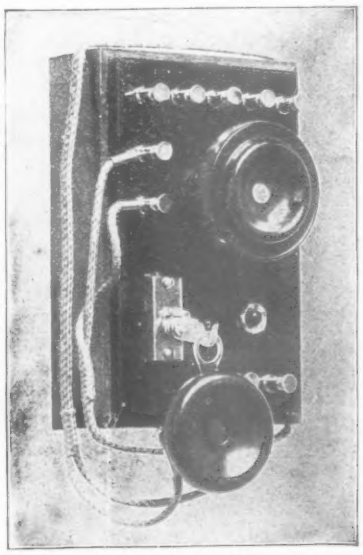
It is not only in this country that telephones engage the attention of the legislature. Last month the telephone question was the subject of a long debate in the House of Commons and a motion was passed to appoint a select committee to determine whether the service be adequate and whether the municipalities should be allowed to establish telephonic systems.

The history of the telephone business in England is of some interest as showing how the present situation has arisen. In all European countries the telephone has been more or less the sport and plaything of the governments. It was, at the time of its introduction, such a novelty, with a future so unforeseen, that they did not know what they would do with it. In Germany alone did the government from the beginning assert its monopoly in the telephone and establish exchanges in connection with the telegraph system. In other countries the governments have played fast and loose with the industry, allowing companies, working under all sorts of restrictions and disabilities, to take the risks of pioneering and then generally buying them out when a solid business had been established.

In England the courts declared the telephone to be a telegraph within the meaning of the Telegraph Act, and telephonic communication—but not the instrument itself, of course—became a monopoly of the government. The working of the telephone was not, however, taken up by the government, but licenses were issued to companies which established themselves in various parts of the country to operate telephone exchanges. The principal conditions of the license were the payment of a royalty of 10 per cent to the Post Office Department on the gross income from exchange business and the abstention from any form of telegraph business, even to the extent of precluding subscribers from writing down messages sent by telephone.

Licenses were granted to various companies which established systems in different parts of the country. A few years ago material changes came over the business; the several companies were all absorbed and consolidated into one, called the National Telephone Company, and the government decided to issue no further licenses for the whole country and to take over the working of the trunk or long-distance lines. This latter step was deemed necessary for the protection of the public property in the telegraph system, to which a comprehensive system of trunk telephone lines would provide formidable competition. Accordingly, in 1892, the Treasury allotted a million sterling to the extension of telephony, a part of which sum was to be used for the acquisition by the Post Office of the existing trunk lines of the company and a part for the construction of a new system of heavy copper metallic circuit lines running through the whole country. This policy was embodied in an agreement between the Postmaster-General and the National Telephone Company in which the company agreed to transfer to the Post Office all its trunk lines and to restrict its operations to local exchange systems in the various cities and towns.

This agreement has been in force for some time, although all of its provisions have not been completely put into effect, but there has been a certain amount of restiveness in regard to it on the part of members of Parliament interested in the more active British municipalities, which, having got control of street railways, gas, electric light, etc., want to take up telephones, too. This feeling culminated recently in a motion made by Mr. Benn, a member of the London County Council, to appoint a committee to inquire into the agreement and the extension of the telephone service generally. This practically meant a repudiation of the agreement and the government, through Mr. Arnold Morley, the Postmaster-General, refused to enter-



A New Type of M. & B. Telephone for Interior Work.

tain such a proposition; the agreement had been entered into in good faith on both sides and it could not be considered other than a binding obligation on the government. After a long discussion it was agreed that a committee be appointed "to consider and report whether the provision now made for the telephone service in local areas be adequate, and whether it is expedient to supplement or improve that provision by the granting of licenses to local authorities or otherwise."

The National Telephone Company has almost a monopoly of the telephone business in Great Britain, and the appointment of the committee practically resolves itself into an investigation of the service rendered and the prices charged by that company. The only competition it meets with at present is that of the Post Office, which maintains exchanges in a few places, but generally on a very small scale, the largest being that at Newcastle-on-Tyne, where the Post Office exchange has about 600 subscribers. The New Telephone Company, which was organized a few years ago to compete with the National company in London, lost its vitality with the death of the Duke of Marlborough, its chief promoter, and has lately been wound up. The National company has at present about 630 exchanges and some 65,000 subscribers in the whole of the United Kingdom. Its license from the Post Office will expire in 1912.

The feeling of those who are dissatisfied with the present situation of telephony in England seems to be divided between the desirability of the breaking of the National company's monopoly by the granting of licenses to the municipalities to establish telephone systems, and the acquisition of the whole system, local as well as long distance, by the government. There is a tendency also among the critics, who are not technical men and do not understand the subject, as the Postmaster-General in defending his position has taken occasion to remind them, to question the efficiency of the service and the reasonableness of the rates.

It is evident that the committee has plenty of work before it. It consists of 15 members, the Postmaster-General being chairman. Hearings were begun two weeks ago and will be continued on two days in each week until the subject is exhausted. We have no doubt that a detailed inquiry such as this will afford opportunity for much interesting discussion on the commercial aspects of telephony, and we trust to be able to extract some of the proceedings for the benefit of readers of the Electrical Review.

A New M. & B. Telephone.

Appreciating the demand for a high-class, compact telephone for interior use in private houses, hotels and public buildings, the M. & B. Telephone Company, Bullitt Building, Philadelphia, have designed the instrument illustrated herewith which they have called "Style C." It will be their standard form for interior work. This instrument is said to equal if not surpass the Bell long-distance 'phone for clearness and volume of sound. It is handsomely finished with slate back and oak case. All the fittings are nickel and the instrument presents an elegant appearance.

It is only five by seven and one-half inches in size and is equipped with a bell push and return signal call. Either a buzzer or loud call bell can be furnished as desired. In hotels this instrument will be found especially useful, as the bell on the telephone in guests' rooms can be used as a call or "wake-up" bell if desired.

OBITUARY.

Mrs. Ella A. Wheeler, wife of Dr. Schuyler S. Wheeler, president of the Crocker-Wheeler Electric Company, died on March 8 at her home in New York city, after an illness of three months. She was the only daughter of the late Richard N. Peterson, a diamond importer and member of the old firm of Baldwin, Sexton & Peterson. She married Dr. Wheeler about five years ago, and was closely in sympathy with him in his electrical and literary work, besides taking an active part in the administration of her father's estate. She leaves an infant son. The Electrical Review joins Dr. Wheeler's many friends in expressing its sympathy with him in his affliction.

ELECTRIC LIGHT FLASHES.

West Randolph, Vt., is agitating an electric light and power project.

Denver is to have an electric-lighted track for horse racing at night.

The electric light plant at Iowa Falls, Ia., is being rapidly completed and is expected to be in operation about May 1.

The electric light plant at Martinsburg, Pa., has been sold at public auction by the creditors of the concern to W. E. Tebo for $18,500.

The Bridgeport, Conn., Electric Light Company has made a considerable reduction in rates for light and the local gas company has followed suit.

The Edison Electric Illuminating Company of New York has issued the following comparative statement of its earnings for March:

	1895.	1894.	Inc.
Gross	$130,407.00	$112,605.16	$17,801.84
Net	65,257.89	60,196.68	5,061.21
Three months:			
Gross	$440,948.22	$371,847.68	$69,100.54
Net	233,870.14	210,025.85	23,844.29

It is reported that the New York Central Railroad has found it cheaper to buy current of a local company for lighting the Union station at Albany, N. Y., than it is to operate their own isolated plant installed at a cost of $20,000.

The Pensacola, Fla., Electric Light and Power Company has been reorganized by the election of Benjamin F. Birch, Jr., as president, and W. S. Garfield as secretary and treasurer, these gentlemen succeeding B. R. Pitts and J. S. Leonard, resigned.

The Edison Electric Light and Power Company, of Erie, Pa., has put in a large amount of new machinery to do the work of lighting the city under the new contract with 2,000 candle-power lights instead of 1,200 candle-power lights, as at present in use.

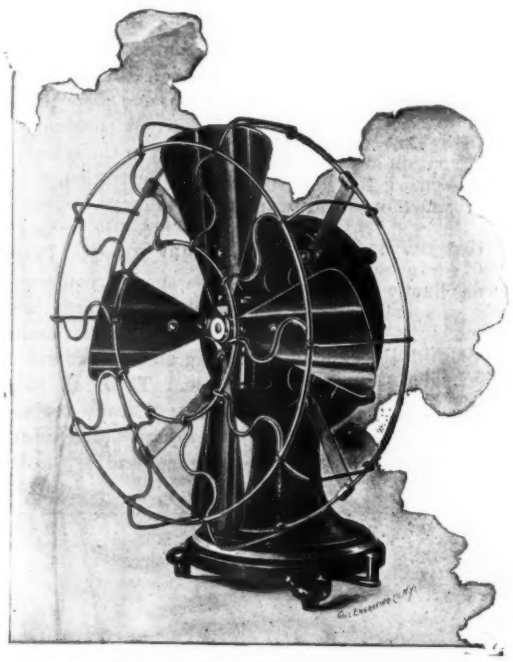
Within 30 days the Indianapolis, Ind., Light and Power Company announces that it will have its alternating apparatus ready for the lighting of residences. The price for incandescent light in residences will be $1.25 for 10,000 watts. A minimum price will be charged each consumer of 15 cents a light.

The Mauch Chunk Electric Light, Power and Heat Company has completed a new power station at a cost of $25,000. It is located on the Lehigh Canal on the opposite side of the river from Mauch Chunk, Pa., and will be operated by water power. The station has five dynamos of a capacity of 1,000 lamps each, and is driven by three horizontal turbine wheels, which, combined, have 530 horse-power.

The Metropolitan Electric Company, of Reading, Pa., has concluded the negotiations which have been in progress for some time for the lease of the plant and franchises of the Neversink Light, Heat and Power Company. The lease is on the basis of a seven per cent rental on the stock of the leased company. This deal gives to the Metropolitan company control of all the means of generating the electric current in and around Reading.

Lundell Alternating Fan Motor Outfits.

The demand for an alternating fan motor as attractive as the Lundell direct current fan motor is now met by the latest production of the Interior Conduit and Insulation Company.



THE LUNDELL ALTERNATING CURRENT FAN MOTOR.

In appearance the Lundell alternating fan motor outfit, which is illustrated herewith, presents an equal beauty of design and finish to the direct current outfit, having a cylindrical field-magnet on a hollow cast-iron base. It is designed in two types, high frequency (14,000 to 16,000 alternations per minute) and low frequency (7,200 alternations per minute) at 52 and 104 volts.

Tests of the high frequency motors show that a current of 1.3 amperes at 52 volts with 12-inch fan is a fair average for their operation.

Like the Lundell direct current motors, they are superbly finished in rich black japanning with gilt stripings. All outside brass fittings, fans and guards are either polished brass or nickel-plated. Self-oiling and self-aligning bearings and a regulating switch giving three speeds are also features.

These motors are manufactured under the patents of Robert Lundell by the Interior Conduit and Insulation Company, of New York city.

The Court of Appeals affirmed on April 9 a judgment for $25,000, including costs, recovered in the case of six-year-old Anne Tholen against the Brooklyn City Railroad Company, of Brooklyn, N. Y. On February 8, 1893, the girl, while crossing Third avenue at Sixteenth street on her way from school, tripped and fell upon the track in front of an approaching car which was then over 25 feet from her. The driver of the car saw the girl crossing and when she fell, but his car was going so fast that he did not succeed in stopping it. She was crushed under the wheels and both her feet had to be amputated. The verdict is the largest so far rendered in a trolley case.

Wilkinson's Oiling Devices.

Wm. H. Wilkinson & Company, 352 Atlantic avenue, Boston, Mass., are manufacturers of a large line of oiling devices which have become very well known and liked. Two of the firm's specialties are illustrated herewith.

Fig. 1 shows the Wilkinson oil distributing device for vertical engines. The body of the device is attached to the cross-head pin and is made so that it can be easily taken apart and cleaned if necessary. The oil cups are supplied with the device but the pipes are procured by the customer and applied to suit the engine.

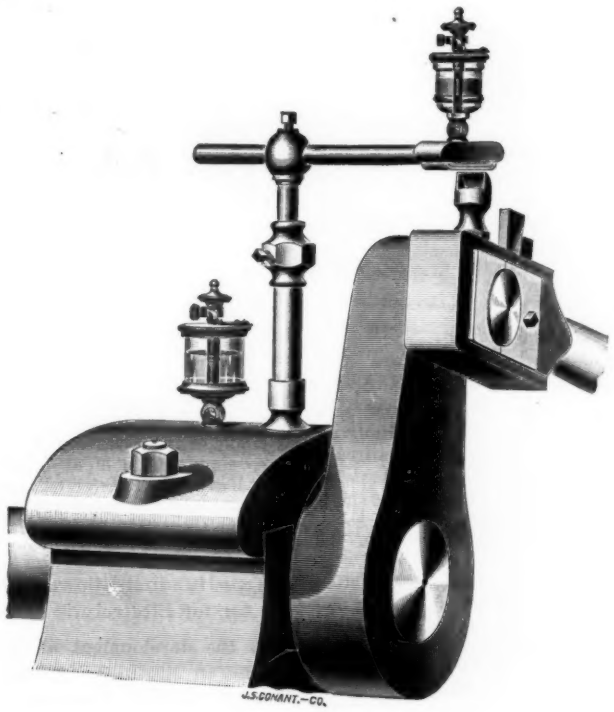


FIG. 2.—WILKINSON'S AUTOMATIC WIPING DEVICE APPLIED TO ENGINE CRANK PIN.

The Wilkinson automatic wiping device as applied to the crank pin of an engine is shown in Fig. 2. Where continuous running is desired, or on high-speed engines, this device is almost indispensable. It has a uniform feed and does not spatter or waste the oil. This device has been on the market for years and has been improved from time to time until it has reached a high standard of mechanical excellence.

The Capacity of Conductors Carrying Currents.*

The definition of electro-static capacity presupposes a state of electrical equilibrium to have been established at the surface of the condutors. It follows, therefore, as has been pointed out by several physicists,† that the expression "Capacity per unit of length of a cylindrical conductor carrying a current" has no precise signification.

Mr. Vaseby has shown that if we define the capacity per unit of length of a cable at any given point as the ratio of the charge Q_1 of the wire per unit of length to the difference of potential V_1 between the wire and the sheath at that point, then the capacity so defined has the same value as the electro-static capacity, so long as the current is constant.

It may be shown that the electro-static capacity of a cylindrical concentric cable is:

$$C = \frac{k}{2\left\{\text{Log } R_2 - \text{Log } R_1\right\}}, \quad (1)$$

R_1 and R_2 being the outer and inner radii of the core and of the sheath respectively, and k the specific inductive capacity of the dielectric, the logs being natural logs. On the other hand, if there is a steady current of constant density in the core, the potential of a point in a right section distant x from the point of zero potential is:

$$v_1 = a\,x$$

In the surrounding dielectric the potential should satisfy Laplaces equation:

$$\frac{d^2 v}{dx^2} + \frac{d^2 v}{dy^2} + \frac{d^2 v}{dz^2} = o,$$

and at the same time it should be zero at all points on the surface of the sheath ($r = R_2$) and $a\,x$ at the given point on the surface of the core ($r = R_1$). The function which satisfies these conditions is:

$$v = a\,x\,\frac{\text{Log } R_2 - \text{Log } r}{\text{Log } R_2 - \text{Log } R_1}, \quad (2)$$

from which it follows that the density at the surface of the wire is:

$$\sigma_1 = \frac{k}{4\pi}\left(\frac{dv}{dr}\right)_{r=R_1} = \frac{k\,a\,x}{4\pi R_1}\,\frac{1}{\text{Log } R_2 - \text{Log } R_1}$$

And when the capacity is defined as given above, we have:

$$c = \frac{Q_1}{v_1} = \frac{2\pi R_1 \sigma_1}{a\,x} = \frac{k}{2\left\{\text{Log } R_2 - \text{Log } R_1\right\}} \quad (3)$$

which expression is identical with that for the electro-static capacity (1). But the form of the equi-potential surfaces is no longer the same. In the case where the cable is in electrical equilibrium, the equi-potential surfaces are concentric cylinders, whereas in the case where a constant current flows through the cable (2), shows us that they consist of a right section of the core and a nappa of revolution about the axis of the core, beginning at the surface of the core at this section and tending to become asymptotic to the cylinder of radius R_2.

The zero equi-potential surface is composed of the right section of the core and dielectric $x = o$ and of the interior surface of the sheath. The equi-potential surfaces are therefore sensibly cylindrical.

This same reasoning can be applied to aerial conductors. It also applies to the case where the current is subject to slow variations, though in such cases it will not be rigorously true. But in the case in which the variations of the current are very rapid, the electrical field can no longer even roughly be considered to have a potential, and the notion of a capacity defined as above ceases to exist.

J. S. S.

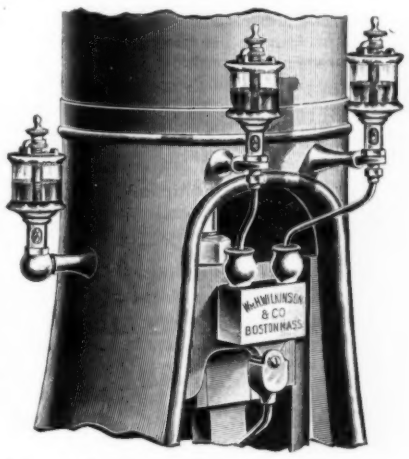


FIG. 1.—WILKINSON'S OIL DISTRIBUTING DEVICE FOR VERTICAL ENGINES.

*L' Éclanage Électrique * * * Comptes Rendus, Vol. CXIX, page 1,198, December 24, 1894.
†Portier, Comptes Rendus, Vol. CXVIII, page 227, 1894. La Lum. Elect., Vol. LI, page 502.

THE TROLLEY IN CONNECTICUT.

IMPORTANT DEVELOPMENTS PENDING.

The following special dispatch from New Haven, Conn., appeared in last Saturday's New York *Evening Post:*

Although many petitions have been put in the legislature for charters of new trolley roads in this State, there is singular delay in offering the charters themselves, some of which are expected to excite sharp contests between the electric and steam roads. The plan of limiting these roads by compelling them to buy right of way outside of the country highways, while apparently growing in favor with the public, seems to be opposed by the steam companies, which fear that such a law, while making much more costly the trolley lines, would give them possession of their own roadway, enable them to increase speed, and therefore make them more dangerous as parallels. Projectors of trolley lines profess themselves opposed to it, too, both because of increased cost and because it prevents their building up traffic along the highways, especially when suburban. In this connection also comes up the question of grade crossings of highways by trolley companies owning their own roadways, which may be another point which the steam and trolley companies may contest.

The question whether the trolley lines impose a new servitude on highways entitling an adjacent owner to compensation already begins to excite much discussion in the State and must go to the courts as soon as any adjoining land-owner can raise it. It is a curious fact that the only Connecticut decision bearing on the matter, so far as a precedent is established by horse railroads, dates back for about a third of a century, Judge Ellsworth holding that a horse-car was a vehicle and kind of enlarged cart or coach, servitude not being imposed merely by the rails. Electricity, overhead wires, and greatly increased speed, many lawyers say, change the conditions on which Judge Ellsworth's decision was based. The general electric railroad law of this State, which gives large powers to local authorities, in no way affects the principle of the right to compensation.

While the New York and New Haven Railroad officers have denied that their company has acquired certain electric properties at Norwalk and Stamford, the impression prevails that those properties have been bought in by allied interests with a view to a transfer hereafter if it is found necessary to break up a parallel scheme.

The New York *Sun*, in referring to this matter editorially, says:

The struggle between the electric or trolley railroads and the steam railroads in Connecticut has become very sharp in the State legislature. The steam people are fearful of the competition of the electric people, fearful that the latter will take the greater portion both of the passenger and the freight traffic, and hence they oppose the granting of charters to them. The electric lines can carry both passengers and goods more cheaply than the steam lines, and they have greater facilities for stoppage at places along their route. If it be so, we do not see how the steam people can hold out against their electric competitors for any great length of time. We do not believe that any legislature can interfere very long with the operation of economic laws or forces.

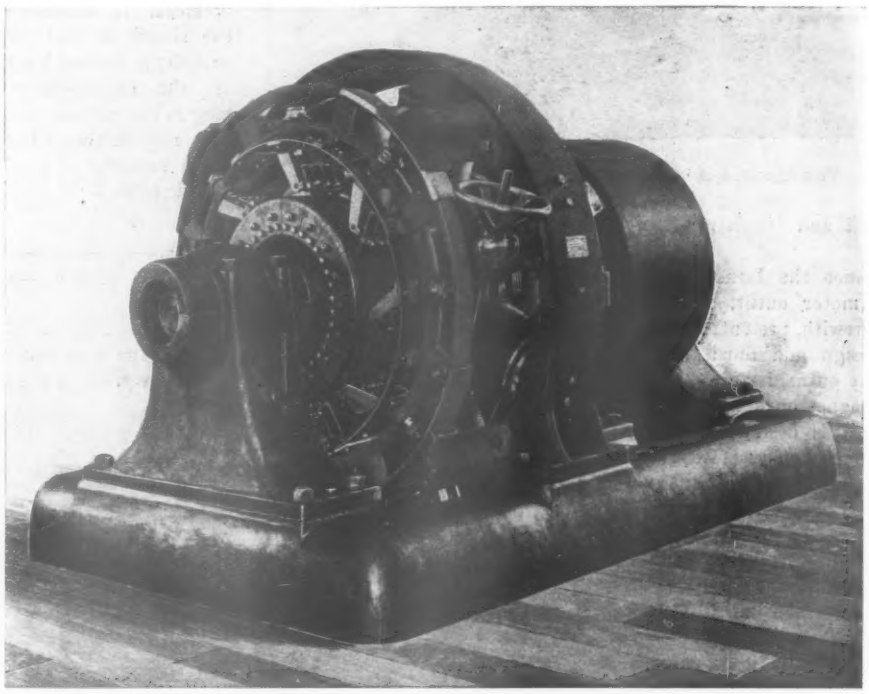
It may be hard upon the steam railroads to lose business; but it is important to the community that transportation shall be as cheap as possible. The steam people have no right to complain even if they should be driven out. For, did they not drive out of business the old stage coaches by which folks traveled, and the wagons by which goods were transported, and the horseback carriers who swept over the highways with their mail bags? Indeed, they did; and thus they threw hundreds of men out of employment in Connecticut, besides reducing the price of horses. They did not care a copper how many stage drivers were knocked out by steam, or how many country inns were ruined by the rail, or how many stables were closed because animals were superseded by engines. Not a copper, so long as they drew their dividends and rose to the top of society. If they, in their turn, are injured by the electric people, they must take the time to think that this world is but a fleeting show, and that the whirligig of time often gives compensation for losses suffered.

Another dispatch from South Norwalk, Conn., appearing in the New York *Sun* on April 7, says:

Preparations for the proposed purchases by the Consolidated Railroad Company of electric street railroads that threatened to parallel its lines are progressing. Within the past few days J. Pierpont Morgan, E. C. Benedict and Mr. Havemeyer, the sugar magnate, and a party of well-known Wall street men have visited Greenwich and Stamford. They had quiet conferences in those towns, and, although the results cannot be given on the authority of the railroad men themselves, it is a conservative statement from trustworthy authorities that the Consolidated Railroad Company has so far pushed its negotiations that the charter of the Greenwich railroad will be renewed or not, as suits the Consolidated officials, who, in case of renewal, will direct the road's more important affairs. It is again affirmed that the Stamford road has come under indirect Consolidated control. It is even said that a big power plant, soon to be established in Glen Brook, will supply electric power, not only for the Stamford street railway, but for the New Canaan branch of the Consolidated railroad. Gen. E. S. Greeley, who for some years has held about $52,000 of the Stamford road's bonds, has become more largely interested in the company and has been elected president. From him the company has obtained money sufficient to liquidate all of its obligations to Messrs. Mansfield, McKibbin, Reed and Johnson, of the Norwalk tramway, and to furnish sufficient working capital to re-equip the road and make some extensions. The latter operations will begin soon, but will probably not be hurried. The tramway's option on the Stamford road was secured for material and services furnished for the Shippan extension.

It is said that Mr. Mansfield first asked $60,000 for a release of this option. He was finally satisfied with Mr. Greeley's personal check for a smaller amount. Mr. Greeley's advances to the Stamford road approximate $100,000. That the Stamford road's franchise will be valuable to the Consolidated as a break in a parallel scheme of its opponents, or a link in one of its own, is plainly evident.

"Not a dollar's worth of the stock or bonds of the Stamford Street Railway, since the company's organization, has been transferred to any one who has any connection whatsoever with the Consolidated road."



GENERAL ELECTRIC COMPANY'S TWO-HUNDRED-KILOWATT-GENERATOR FOR ELECTROLYTIC WORK.

A Two-Hundred-Kilowatt Generator for Electrolytic Work.

In the development of apparatus for use in electrolytic processes the General Electric Company has attained the same degree of perfection as is characteristic of its apparatus employed in other branches of the electrical art, but such is the dissimilarity of all electro-chemical processes that the design of a standard series of generators for electrolytic purposes, as has been done for lighting and power work, has been out of the question. There are scarcely any two classes of electrolytic work for which the voltage and current output are similar, and, consequently, the design of the dynamo employed has to be adapted to the special local conditions under which each process is carried out. In electrolytic work the general conditions require a machine with a heavy current output and a low voltage, one that may be relied upon to run continuously with no more attention than can be given to it when in motion, and one that will maintain the current constant, even with wide variation in the external resistance.

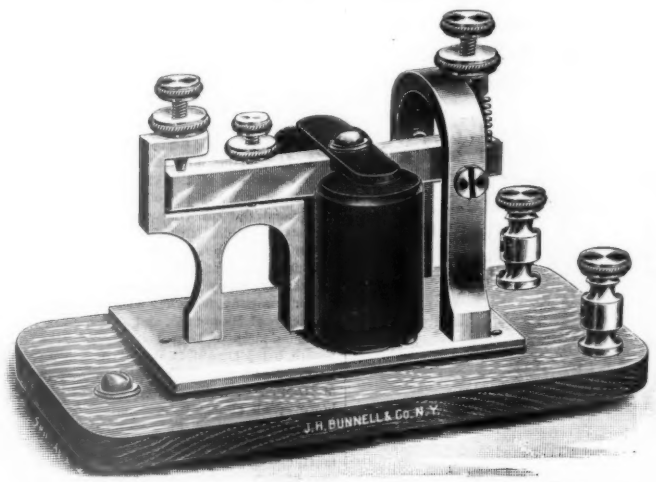
The illustration on this page shows a 200-kilowatt generator which has been recently constructed by the General Electric Company to meet these special requirements. It is an eight-pole dynamo having a smooth core armature of laminated iron carrying machine wound coils of copper cable. These are so adapted as to admit of ready replacement in case of injury. The bearings are self-aligning and self-oiling. The commutator shell is divided into sections allowing of the removal of segments without removal of the commutator or disturbance to other segments.

The excellence of the armature ventilation and the low current densities in the windings, brushes and commutator render this type of machine extremely cool-running even under full load for a long period. It does not spark at the commutator, the life of which is, moreover, increased by the extreme depth of the segment.

The generator in question was designed to give 200 kilowatts under a wide range of voltage without material change in its structure. At 300 revolutions it gives a current of 1,330 amperes at 150 volts. A larger generator of similar type is now under construction for an output of 3,600 amperes at 75 volts and 280 revolutions. Electrolytic apparatus manufactured by the General Electric Company can now be found in almost every electrolytic establishment in this country.

A New Telegraph Sounder.

The latest type of telegraph sounder made by the well-known house of J. H. Bunnell & Company, 76 Cortlandt street, New York city, is shown in the illustration herewith. A principal point of merit is the combination of the aluminum lever, the most resonant of metals, with the well-known Bunnell sound amplifying base, thus making what is claimed to be the most perfect sounder ever produced. The lightness of the lever, together with the superior winding and general construction of the apparatus, makes one cell of gravity battery amply sufficient for its perfect operation. At a low calculation the maintenance of a gravity cell amounts to about one dollar a year; thus the saving in local batteries by the use of this sounder would be an important item to telegraph and railroad companies. It will be noticed that the trunnion screws are simple and non-adjustable.



J. H. BUNNELL & COMPANY'S NEW TELEGRAPH SOUNDER.

LITERARY.

We have received from G. P. Putnam's Sons "A Sound Currency and Banking System—How It May Be Secured," by Allen R. Foote.

We have received from the Board the "Tenth Annual Report of the Board of Gas and Electric Light Commissioners of the Commonwealth of Massachusetts."

"Annual Report of the Light House Board to the Secretary of the Treasury for the Fiscal Year Ended June 30, 1894," has been received from the Treasury Department.

We have received a copy of the fourth thousand, new and revised third edition, of "Practical Directions for Electric Gas Lighting and Bell Fitting for Amateurs," by Edward Trevert. The work was issued in response to a demand for a small, low-priced manual on the subject. It is not designed for expert bellfitters, but for amateurs and those who wish to inform themselves in this branch of work. In this edition the greater part of the book has been rewritten and new diagrams have been added. The book will be sent postage free on receipt of the price, 25 cents, by the ELECTRICAL REVIEW Publishing Company, 13 Park Row, New York.

Electric Lighted Signs.

The recently completed electric sign at the Standard Theater, New York, of "Wm. Gillette in Too Much Johnson," is composed of 576 sixteen-candle frosted lamps. These lamps are mounted on the zinc backing by a socket through which is a peculiar conduit with a fibrous insulation adapted for out-of-door use, preventing the destruction of the lamps. The frosted lamps were used as the diffusion of light is more perfect than through plain glass. The sign is said to have cost the theater over a thousand dollars.

H. L. Worthington & Company, 244 West Forty-first street, New York, in addition to this, have recently constructed electrical signs for the Girard House, Herald Square Theater and Academy of Music.

KIND WORDS.

WISHES THE "ELECTRICAL REVIEW" WAS A DAILY PAPER.

To the Editor of Electrical Review:

I think the ELECTRICAL REVIEW is a *fine* paper. I wish it was a daily paper. I can hardly wait for it to come. Hoping for your success.

F. J. R.

Ohio, April 6, 1895.

THE QUALITY IS RIGHT.

To the Editor of Electrical Review:

I think the ELECTRICAL REVIEW is one of the best electrical papers I have ever seen. G. P.

Batavia, N. Y., April 9, 1895.

The contract for a complete electric lighting plant at Plattsburg, Mo., has been awarded to the Franklin Electric Company, of Kansas City, Mo.

Massachusetts Electric Lighting Statistics.

According to the tenth annual report of the Massachusetts Gas and Electric Light Commissioners, there were 32 deaths in that State during 1894 from inhalation of illuminating gas and but three deaths from electricity. Aside from these there were 21 accidents from illuminating gas in which 41 people were affected, and four accidents through electricity, affecting four people. The three persons killed by electricity were all linemen and all were stricken while trimming arc lamps while the current was on. Their own carelessness caused their deaths. Three of the four accidents caused by electricity and resulting in only temporary injury happened to linemen who came in contact with live wires while at work. The fourth accident was that which happened to Mr. James E. Cutler at the Stanley Electric Manufacturing Company's plant at Pittsfield, Mass. This accident was fully reported in the ELECTRICAL REVIEW. The casualties caused by illuminating gas affected a total of 73 persons, none of whom was an employé of a gas company. It therefore appears that while electricity played a part in but seven casualties as against 73 credited to gas, the persons affected by electricity were all employés of electric companies while those affected by gas were the general public. In this instance, at least, it is shown that electricity is safer than gas as an illuminant in the proportion of about 10½ to one.

On June 30, 1894, there were 81 electric lighting companies in active operation in the State. Of these, one company was in a receiver's hands. During the year ending June 30, 1893, the aggregate results of the operations of all the central stations in the State show a deficit of $4,832.18 while the year ending June 30, 1894, shows a surplus of $51,275.55.

Who Makes This Machine?

The ELECTRICAL REVIEW has an inquiry for the address of the makers of "a machine with storage battery for cutting names on metal." Our correspondent says he saw the machine at the World's Fair. We will thank any of our readers to furnish us the desired address.

ESTABLISHED 1867
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ELECTRICAL SUPPLIES
125 South 2d St. Philadelphia
CATALOGUES ON APPLICATION
Send Business Card and Mention ELECTRICAL REVIEW.

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PATENT CONNECTORS AND TERMINALS
FOR ALL ELECTRICAL PURPOSES.
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MOTHER OF PEARL
Made into any design for Electrical Trimmings, Push Buttons, Knobs, Handles, etc. Can be made to cost no more than other material.
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POPE, READ & ROGERS,
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FRANKLIN L. POPE.
ROBT. H. READ.
EDWARD H. ROGERS.

Electrical Inventions a Specialty.

Official Notice No. 46.

(PUBLISHED BY AUTHORITY OF THE COMMON COUNCIL OF THE CITY OF SHEBOYGAN.)

NOTICE TO ELECTRIC LIGHT CONTRACTORS.

Office of Board of Public Works,
Sheboygan, Wis., March 23, 1895.

Sealed proposals will be received at this office until April 29, 1895, at 3 o'clock P. M., for lighting the streets of the city of Sheboygan for the term mentioned hereinafter, upon the following conditions:

I. Price per lamp per year, for 128 or more Electric Arc Lamps, of full 2,000 candle-power, to burn every night in the year from 30 minutes after sundown until 30 minutes before sunrise.

II. The entire plant to be of the safest and most approved pattern and quality, and every reasonable precaution taken to guard against danger and damage to persons and property.

III. Each bid to be accompanied by a bond or deposit of Five Thousand Dollars ($5,000.00), conditioned upon the bidder promptly entering into a contract, should the contract be awarded to him, and in case a bond is given the same must be executed by sureties living within this State who shall justify in at least twice the amount of the bond.

IV. The Board to reserve the right to reject any and all bids.

V. All poles, wires and lamps to be erected under the supervision and approval of the Board of Public Works.

VI. The time and place of opening the bids, April 29.

VII. Separate bids to be made for the terms of 5, 10, 15 and 20 years.

All bids must be stated in writing and in figures, otherwise they will not be considered.

All money deposited will be returned to unsuccessful bidders on award of contract, and to successful bidders when contract is entered into.

The Board reserves the right to reject one or all bids.

H. J. WEIGAND,
PAUL T. KREZ,
FRED ROSENTHAL,
Board of Public Works.

Countersigned
JOHN SCHMIDT, Compt.

NOTICE.
We are anxious to extend the trade for our Dynamos and Motors among Electric Power and Railway plants.
Our apparatus is conceded to be both mechanically and electrically superior.
Let us quote you our present prices, which are little in advance of prices for ordinary apparatus.
CROCKER-WHEELER ELECTRIC COMPANY,
Manufacturers and Electrical Engineers.
New York. Chicago. Boston. Philadelphia.
Sizes up to 250 H. P.

KINDRED INTERESTS

The Metropolitan Electric Company, Chicago, are finding very ready sales for their new carbon open-circuit battery that they recently put on the market.

The M. & B. Telephone Company, Bullitt Building, Philadelphia, has prepared neat descriptive circulars of its apparatus, which will be sent free on request.

McKenney & Waterbury, 181 Franklin street, Boston, Mass., the well-known manufacturers of artistic gas and electric fixtures, are handling the Kinsman desk lights.

McLeod, Ward & Company, electrical contractors and supply dealers, will remove before May 1 to the Thames Building, Greenwich and Thames streets, New York city.

The Berlin Iron Bridge Company, of East Berlin, Conn., is sending out a handsomely lithographed calendar showing in colors typical illustrations of the class of work done by the company.

The Kinetoscope now on exhibition at 19 Park Row, New York city, is an extra large one and faithfully reproduces the exciting six-round fight between James J. Corbett and Peter Courtney, which took place at Orange, N. J., on September 8, 1894.

The Metropolitan Chandelier and Electric Supply Works, Hudson and Twelfth streets, Hoboken, N. J., has recently installed an equipment for general experimental work and the manufacture of ammeters, voltmeters and arc lamp repairs. Emil Schmidt, general manager of the company, is a graduate of the Siemens & Halske shops in Berlin.

Morris & MacCurdy, Indianapolis, Ind., makers of the Phœnix insulating paint, report that their product is meeting with flattering success, and that the testimonials they are receiving are far beyond their expectations. This firm has just completed a large warehouse for carrying stock and manufacturing, and are now prepared to make shipments from five gallons to a car load on 24 hours' notice.

F. F. Bailey & Company, who for a number of years have represented the Harrisburg Foundry and Machine Works (Ideal engines), in Philadelphia and vicinity, have moved from 701 to 913 Betz Building, and are now representing the Armington & Sims Engine Company, of Providence. Their territory extends over quite a number of States, and judging from the former success they have had, their prospects are very good for a large portion of first-class engine and boiler business.

The Electric Construction and Supply Company, of Wilmington, Delaware, have been awarded the contract for furnishing the electrical material for the electric light plant now being built at Fort Delaware. The McCay-Howard Engineering Company, of Baltimore, Md., received the contract for the engines, boiler and generators, and the Westinghouse Electric and Manufacturing Company will build the electric locomotive for the trolley line. Work on the plant will commence April 20.

The Syracuse Storage Battery Company, Herald Building, Syracuse, N. Y., recently received the following letter from the Paragon Plaster Company, of Syracuse:

The storage battery, consisting of 26 cells, placed in the Paragon Plaster Company's mill about two years ago, has been in almost constant use and has given excellent satisfaction. We have about 50 incandescent lamps of 16 candle-power and one arc lamp of 1,200 candle-power. The battery handles these with ease. Some of these lamps burn all night. We run our dynamo on an average two afternoons per week for charging. The steadiness of the light is remarkable; there is not the least variation. The battery never fails to work and requires very little attention. No repairs have been necessary, except to change the acid once, at a cost of about $7. We are very glad at all times to show the battery in operation to any one interested.

WANTED.

Estimates on the cost of an arc light plant, complete, that will furnish eighty to one hundred 2,000 candle-power arc lights each, for town of 6,200 population.

For further information apply to

F. R. KULP, or

WILLIAM CONRAD,

Town Council Committee,

Tamaqua, Pa.

F. W. DARLINGTON,

Consulting Electrical and Mechanical Engineer.

907 DREXEL BUILDING, PHILADELPHIA, PA.

Estimates, Plans, Specifications and Superintendence. Electric Railways. Electric Power. Isolated Electric Light Steam Plants.

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MANUFACTURERS OF ELECTRIC SIGNS etc.

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Sight Feed Oil Cups.

AUTOMATIC "WIPING DEVICE"

For oiling Crank and Cross-head Pins.

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STEAM ENGINEERING

(Stationary, Locomotive or Marine); Mechanics; Mechanical Drawing; Electricity; Architecture; Architectural Drawing and Designing; Masonry; Carpentry and Joinery; Ornamental and Structural Iron Work; Railroad Engineering; Bridge Engineering; Municipal Engineering; Plumbing and Heating; Coal and Metal Mining; Prospecting, and the English Branches. Students make rapid progress in learning to Draw and Letter. The Steam Engineering course is intended to qualify engineers to secure Licenses. Send for Free Circular, stating the subject you wish to study, to

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THE INTERNATIONAL CORRESPONDENCE SCHOOLS, Scranton, Pa.

WANTED BY A YOUNG MAN of experience, a position as superintendent of an electric light plant. Good references. Address

"H," Care of ELECTRICAL REVIEW, 13 Park Row, New York.

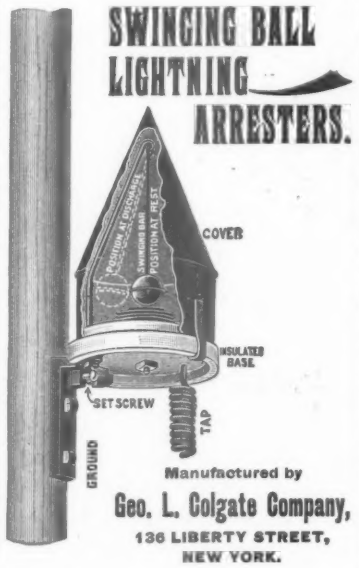
EXPERIMENTAL WORK.

Metropolitan Chandelier and Electric Supply Works,

HUDSON & 12th STS., HOBOKEN, N. J.

Arc Light Repairing.

SWINGING BALL LIGHTNING ARRESTERS.



Manufactured by

Geo. L. Colgate Company,

136 LIBERTY STREET, NEW YORK.

FOR SALE.

Two 40 horse-power Otto gas engines, in perfect order, having just been thoroughly overhauled at the Otto Engine Company's factory, and are at their works for shipment. For particulars, write

NEW ENGLAND ENGINEERING COMPANY,

WATERBURY, CONN.

NOTICE OF RECEIVER'S SALE.

Electric Light Plant.

Notice is hereby given that the undersigned, Receiver of all the property and estate of the Hammond Light and Power Company, of Hammond, Indiana, heretofore appointed by the Lake Circuit Court of said State, will offer at public sale, to the highest and best bidder, upon terms hereinafter expressed, on the 25th day of April, 1895, at 10 o'clock A. M., at my office in the said city of Hammond, the following property, to wit: All the property, rights, franchises, privileges, plant, power house, power plant, engines, dynamos, machinery, boilers, poles, wire and all fixtures and appliances owned by said Hammond Light and Power Company, including as well franchise from said city of Hammond, and its franchise from the commissioners of Lake county, and also its Real Estate, being Lots 21, 22 and 23, in Block 17 of east part of North Side addition to the town (now city) of Hammond, Lake county, Indiana; excepting, however, all choses in action, book accounts and other accounts and bills receivable of the said company. Said property to be sold subject to a mortgage indebtedness of $30,000, and for not less than $15,000. A deposit of $2,000 in cash or certified check for that amount shall be required of each bidder before receiving bids, said sum to be applied to the purchase price of successful bidder, and the deposit of other bidders returned to them at once. The further sum of $5,000 to be paid Receiver upon confirmation of sale by said court, and balance of purchase price to be paid 45 days from the date of confirmation of such sale. Said sale to be made in conformity with the order of said court, entered March 8, 1895. Address all inquiries to the undersigned.

ADELBERT W. WARREN, Receiver.

The Mather Electric Company

MANCHESTER, CONN.

POWER GENERATORS, for Lighting and Railway Purposes,

COMPLETE STATION EQUIPMENTS. Mather Apparatus for sale exclusively in their respective territories by the following well-known and reliable Contractors:

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H. B. COHO & CO., 203 Broadway, N. Y. City, Brooklyn and vicinity, and New Jersey.
G. M. ANGIER & CO., 64 Federal Street, Boston, Mass., New England.
S. N. BLAKE, Elmira, N. Y., Northern and Western New York.
THE WILL & FINCK CO., 818 Market Street, San Francisco, Agent for Pacific Coast.

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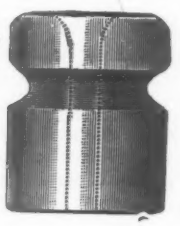
BROOKLYN, N.Y.